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ABSTRACT

This discussion paper explores the extent to which new learning technologies can help make learning more available, accessible, and compatible with women's needs and goals. The following topics are discussed: the paper's framework and data sources (discussions with individuals from all regions of Canada whose experience encompasses a range of formal and nonformal education and training, a review of literature on women and new learning technologies, and a review of public policy documents related to technology and learning); expectations and educator provision of access for women and the four levels of access (infrastructure and community, institutional, and individual access); costs and use of resources (values and cost, payment for education and training in Canada, and comparative costs of "old" and "new" technologies); quality and equality of learning (perspectives on learning, different learning tasks, instructor perspectives, keeping a holistic approach in the forefront, the economic rationale); opportunities for learning (nonformal learning and information sharing, formal learning, good examples, the global picture); and tools and strategies (finding and sharing information, evaluating programs, discovering real options, exploring underlying values, conveying concerns to decision makers). A 21-item annotated bibliography and 99-item bibliography are included. (MN)

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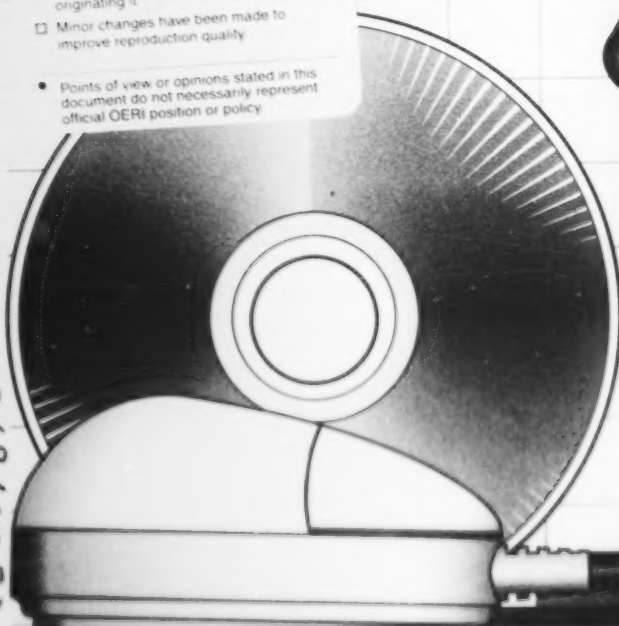
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Canadian
Congress for
Learning
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DISCUSSION PAPER

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Canadian Congress for Learning Opportunities for Women

The Janus Project

**New Learning Technologies:
Promises and Prospects for Women**
A Discussion Paper

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March 1997

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Executive Summary

Background

A project to review the potential impact of new learning technologies on women's learning was developed in late 1995 by the Canadian Congress for Learning Opportunities for Women and funded by the Office of Learning Technologies, Human Resources Development Canada, in 1996. The project is named for the ancient Roman deity Janus who was the guardian of gates and doors and who had two faces, one looking forward and the other looking back.

The project consists of two parts: the development of a discussion paper, and a conference to review issues related to new learning technologies and women's learning. This discussion paper identifies issues related to new technologies and women's learning and is designed to promote discussion among those concerned with women's learning, including learners, educators, program planners, facilitators and policy makers.

Overview

New communications and information technologies are always potential new learning technologies. If used appropriately, they offer the prospect of enhanced and more accessible learning, education and training. These prospects are particularly significant for women who rely on flexible arrangements, such as part time studies, open and distance learning, and community based programs, for both formal and non formal learning. But all technologies function within a system of human organization. To realize the learning potential of new communications and information technologies, the context, learning goals and the human dynamic essential to teaching and learning must be taken into consideration. This paper, then, considers these factors, particularly as they relate to women's learning.

The study entailed an exploration of the literature on technology and learning and discussions with those directly involved in women's learning. We have broken the paper into the key issues that emerged, which are: access, cost and use of resources, quality and equality of learning, and opportunities made possible by new technologies. Since many also expressed the need for concrete strategies to examine issues related to technology, we have included a final section on questions that emerged and strategies that were suggested for considering the impact of technology-related decisions.

Access

Improved access to learning is an often-repeated rationale for using new technologies. This section compares existing provisions for providing access to learning in Canada, particularly for women, with the potential of new technologies. Because of the high cost of some of the newer technologies and of the infrastructures required to support them, many will have more limited access to learning unless there are interventions to ensure equity. Those most vulnerable to reduced access are people in rural, remote and less populated regions, those with limited money to invest in technology and those whose first language is not English. While these are characteristics of whole populations, the impact on women is potentially much greater because of women's greater reliance on part time, distance and continuing education, where new technologies are being introduced at a significant pace.

Exploring the issue of access entails comparing what is offered by new technologies with what is already

available, and watching out for situations in which there is expanded access for some, and more restricted access for others.

Questions

Specific questions about access to learning for women include:

- What is good access to learning opportunities? How does that compare with what is available in the community?
- How well are proposed community access learning centres serving adult women learners, whether provided by local or provincial agencies or through SchoolNet or the Community Access Programs?
- Who has access to the Internet in my community? Are there age and gender statistics?
- What training is available for users at the local community learning or access centre? How accessible and friendly is it for women learners?
- How does access to learning now available in my community compare with what has been in place? Are technologies being used to replace on-site classes, or are they providing learning opportunities that weren't available before?
- What must be invested personally, in time and money, to obtain access to learning that meets a learner's needs? Does this type of learning require using new learning technologies? old learning technologies?
- What plans are in place to provide broadband telephone access to my community? What will it cost the user when it is in place?

Cost

New technologies require a number of investments. Educational providers must invest in communications infrastructure, facilities and equipment, and reallocate funds and human resources. At the personal level, expenditures must be made for equipment and software, and many new technologies entail ongoing costs such as additional phone lines or Internet service fees. Cost and use of resources are considered in light of various choices and the values underlying them, particularly in the context of reduced funding for education and human services.

The cost of new technologies has implications for quality and access. The tendency to recover higher development costs by expanding enrolment can mean reduced student support; selling programs to other providers can result in a poor fit between programs and learners' needs. Unless there are policies to maintain affordability for learners and unless educators monitor the outcomes of using new technology, learners could face higher costs and less accessibility than previously.

Questions

Basic questions to ask include "what does this cost" and "who is paying for it?" Further questions can explore costs in terms of values:

- What is the purpose of this investment? To provide better access, more successful learning outcomes (and how do we define success), or to achieve some other goal?
- What is the value returned for the expenditure?
- How can it be demonstrated that educational technologies are achieving the intended goals; for example that they provide better access than the alternatives?
- How can we be assured that the costs of the new learning technologies are "worth it", and can there be an agreed set of values to measure this worth?
- Are the costs of new technologies justified in terms of specific segments of the population who have previously been underserved?
- Is the investment in new technologies the best use of funds? For example, in comparison to subsidizing child care so that women can more readily participate in education and training?

Quality and Equality of Teaching and Learning

In this section, the quality of education is related to the process of human growth rather than to a production system of measurable results. Feminist pedagogy, adult education and distance education all stress the importance of connection, including both the social interaction with other learners and educators and the ability to link new learning to one's context, prior knowledge and life experience.

The ability to support social learning and integration of knowledge is an important comparison to make between new technologies and other approaches. Technologies have the potential to promote interaction among learners and instructors, in turn developing contact and connectedness. On the other hand, technology-related factors can threaten the learning climate. The sense of safety can be disrupted, technical support is often lacking, and the essential human aspect of teaching and learning can be overshadowed by an emphasis on perceived economies.

The direct experience of learners, instructors and facilitators in using new learning technologies is an important touchstone in exploring issues of quality and equality of learning.

Questions

Questions to ask about the quality and equality of learning are:

- Is the new technology appropriate for the learning task at hand?
- Does this technology broaden, rather than narrow, the kinds of teaching and learning approaches that can be used?
- Does it support individual learning, by permitting self-pacing, ready access, learner control?
- Does it support social learning, by enabling consultation, peer learning, mentoring?
- Is the technology transferable so that it is useful not just in the specific learning context but in other learning contexts, at work and at home?

- What advantages does it offer over other methods, for example, classroom learning or other technologies?

Opportunities for Learning

The potential of technologies for women's learning is demonstrated in a variety of contexts and applications. Women have tended to adapt and use technologies in ways that were not originally anticipated and this is true for women's use of learning technologies.

Women use technologies to share information and experience and to develop action strategies, and there is great potential for communication among women across great distances, nationally and internationally. Some programs use women-friendly approaches, such as mentoring, to help women learn about the technology itself. E-mail and computer conferencing are used in formal education for cooperative learning, and databases in diverse topics can be built up by learners' individual and collective contributions.

These examples demonstrate what can be achieved if the context and conditions are right, and also provide some guidelines for ensuring that proposed uses of technology represent a genuine improvement over what was previously available.

Questions

The following questions address issues that commonly arise with new programs and new technologies:

- What new opportunity does it provide? To whom does it provide it?
- How is the opportunity provided: what systems does it use, what support, staffing, and so on?
- What are the prospects for sustainability?
- How durable or stable is the technology? How likely is it to change, and if it changes, will it displace the learning opportunity or require retooling?
- What are the "opportunity costs"? Are there trade-offs that might mean, for example, reduced funding for other programs or limited access because the technology is not generally available?

Tools and Strategies

Any innovation can be intimidating. The advent of new technology so far reaching yet, in relation to learning, so closely connected with our lives can be immobilizing if people feel they are not equipped to understand it, much less deal with its implications. But the development and use of technologies is simply the outcome of human decisions, which we are all equipped to understand and question. The tools and strategies included here were developed from suggestions offered in the course of the study.

This compendium is based on feminist approaches to social issues, on grassroots community based education, and on traditions of citizen participation in decision making. It is hoped these ideas will serve as a starting point for further discussion and consideration of new technologies.

Conclusion

It is hoped that the Janus project will stimulate thoughtful approaches to new technologies, enable greater understanding of related issues, and enhance confidence in the creative questioning needed for the wise use of these tools.

Section One

Introduction

Purpose and Framework

This paper is a first step in exploring the impact of new learning technologies on learning opportunities for women in Canada, a process undertaken by the Canadian Congress for Learning Opportunities for Women (CCLOW). It is designed to promote discussion and reflection, and to identify issues most important to those who are concerned with women's learning as educators, learners, facilitators, planners and policy makers.

There are a number of reasons why it is timely to look at new learning technologies and

- the recent women intense interest in new technologies and their potential for learning
- the importance for women of opportunities to learn, especially for those who have not had access to formal learning, those who want to continue their education, those who rely on mentoring, networking and information sharing to continue in their work, community or family commitments, and those for whom learning is a passion
- the prevailing concern about having income-generating work in the near and longer term future, and the sense that additional learning can be an advantage in the workplace.

In Canada, questions related to education, communications and technology are bound up with our governance, geography and private and public sector institutions. It sometimes is difficult to address specific issues without unearthing the tap roots of ongoing political, social and economic debates. However, references to these broader issues will be as tailored as possible to the questions at hand, recognizing that their extent and complexity goes far beyond the scope of this paper.

What are new Learning Technologies?

"Educational technologies are not simply the tools of educators—although this is a popular misconception; rather, they are the knowledge, values and practices which constitute the development and use of those tools."¹

It can be said that there have always been learning technologies, tools such as books, chalk and chalkboard, overheads and so on, that people use in the process of teaching and learning. Print, audiotape, telephone and video all help teachers and learners communicate at a distance for instruction and interaction. So what is "new" about new learning technologies?

In this discussion paper, "new" technologies encompass electronic technologies used for enhanced communication and interaction. These include:

- technologies such as videoconferencing and audioconferencing which, although not very new, are being applied in new ways because of technical and social developments

- computer based technologies, such as electronic mail, computer conferencing
- technologies that provide access to information, such as the Internet and the World Wide Web

The new learning technologies, like all technologies, are part of a system. Ursula Franklin points out, "technology involves organization, procedures, symbols, new words, equations and most of all, a mindset."² In other words, this study will examine not just technologies in isolation, but the ways in which people change or adapt their ways of doing things as part of using technologies.

Opportunities for Learning

The concept of "opportunities for learning" is linked to two prevailing beliefs: first, that there should not be barriers to learning because it is an important attribute of citizenship and, second, that people will take advantage of opportunities to learn.

The first belief has served as the basis for many initiatives to make learning available to a broad range of people, from those in remote locations to those who have learning disabilities. The second belief can be problematic because there are different interpretations of what is meant by the opportunity to learn. While some educational providers take a "build it and they will come" approach, intended learners sometimes do not participate because it is not what they wanted or there are barriers the provider did not perceive. Potential and actual learners, rather than educational providers, are in the best position to determine what is a genuine learning opportunity.

A "learning opportunity," then, can be defined as a situation in which the intended learners are able to participate successfully in a program in a manner that is appropriate to their particular context.

Opportunities for Women

Only in recent years has there been a sense among the Canadian population that the education of girls and women is equally important as the education of boys and men. This means that as young people many women did not have opportunities to proceed with their education. Even despite several decades of affirmative action and equal opportunity policies, there continue to be constraints on women's education.

Not until 1981 did the proportion of young women aged 15 to 19 attending school equal that of young men of the same age, and not until 1991 did the proportion of women aged 20 to 24 attending school equal that of men of the same age.³ In Canadian universities, although there are now slightly more female than male undergraduates, there is a greater proportion of male graduate students in most disciplines and far more male full time tenured faculty. Optimistic estimates are that it will take a generation to change the profile of a male-dominated academia, to warm up the "chilly climate" that discourages women from pursuing further studies and bars them equal recognition as teachers and leaders in the academic world.

In the field of technical and vocational training, factors ranging from outright hostility to lack of job opportunities discourage a significant increase in women's participation in what are termed "non-traditional" trades. There are also women for whom formal or informal learning has not been available because of

circumstances, family or work commitments, distance, language, or disabilities.

For many women, the possibility that learning could become more available, accessible and compatible with their needs and goals is exciting. This paper explores to what extent new learning technologies can support this possibility and examines some of the limitations.

An Outline of the Methodology

The investigations carried out for this paper include:

- discussions with individuals from all of Canada's regions whose experience encompasses a range of formal and non formal education and training: programs for women new to Canada, for aboriginal women, professional women, literacy programs, English as an Additional Language programs, workplace training and advocacy training
- a review of the literature, including both print and electronic publications, on women and new learning technologies as well as the social and economic underpinnings of technology and women's use of technology for learning
- a review of public policy documents related to technology and learning, such as reports of the Information Highway Advisory Council (IHAC), and documentation developed by private and public agencies directly involved in communications and information fields, (telephone companies, cable companies, ministries of education).

An Overview of the Issues

The issues that emerged from the study fall into these general categories, all closely interlinked: access, costs and use of resources, quality and equality of learning, new opportunities for learning, and tools and strategies that can be used to track questions related to new learning technologies. Following are summaries of these issues which are covered in separate sections of the paper.

Access

Access is explored on a number of levels:

- national and regional infrastructures that support the use of communications technologies
- institutional or organizational systems to support learning using new technologies
- local or community based facilities that enable residents to participate in activities using new technologies
- individual learners' circumstances that determine the extent to which they have access new technologies

This section provides an overview of the communications infrastructure in Canada. Examples of institutional arrangements and community situations are considered, as are factors that affect an individual learner's ability to take advantage of what is offered via new technologies. Questions are raised about what resources are available to whom and how decisions affecting access are made.

Cost and use of resources

The question of costs and use of resources is considered on levels parallel to those used for access:

- national and regional investments in infrastructure
- institutional or organizational decisions about technologies, programs, and categories of learners
- local or community decisions about facilities such as computer access in libraries or a videoconference site, and about programs to support the use of technologies for learning
- individual learners' investment in technologies and the cost issues that arise at the personal and family level

This section also considers choices about the use of resources. For example, how people's time is allocated or reallocated when learning technologies are used, and where resources come from in terms of external funding sources or other programs that may face cuts because of investment in learning technologies.

Equality and Quality of Learning

The following questions are raised in this section:

- Do technologies enable learning to take place more effectively, accessibly and appropriately, and do they do this better than available alternatives including other technologies and face to face learning?
- Do new technologies lend themselves to approaches that support egalitarian learning, such as feminist pedagogies, participatory learning, and adult education practice?
- Do new technologies support a range of learning, including cognitive and affective learning and skills development, and how well do they meet the needs of learners' individual learning styles?

This section does *not* undertake an assessment of particular technologies or their potential applications because this type of analysis, to be meaningful, must consider the particular context, content and learning strategies. Instead, we suggest ways of evaluating technologies for learning tasks and of adapting the broader questions to specific situations.

Opportunities for learning

This section examines opportunities for women's learning offered by new technologies. Among many enthusiastic reports, we sought out those that demonstrate genuine, sustainable improvements in accessible learning for women. Instead of speculating about future potential, we look at actual experiences of using new technologies to support women's learning. These have been provided directly by individuals or from reports prepared by people involved in programs, and they demonstrate situations in which technology makes a significant contribution to supporting women's learning.

Direct observation and/or continuing evaluation are good ways of determining the effectiveness of a program or approach and of how well a good example will transplant to another situation. This section includes questions to assess cases presented as good examples and their potential as models for other contexts.

Tools and strategies

This section complements each of the previous sections and can serve as a link between the paper and subsequent discussion and activities. It presents strategies to examine decision making about education, public policy and technical developments at a variety of levels as they relate to technology and women's learning. This section's compendium of basic questions about access, cost, and equality and quality of learning can be further developed and modified to address specific situations.

A Practical Canadian Perspective

There are many possible ways of looking at the issue of women and technology. Our research uncovered a spectrum of viewpoints, from those that considered technology a tool of the dominant in society to those that regarded it one of the best outcomes of humanity's drive to change and improve. The approach that seemed most sensible to us was to consider technology in context, in its habitat, so to speak, of social, cultural, economic and political life and decisions. This approach is expressed by Ursula Franklin in *The Real World of Technology*, as she describes what it means to define "technology in its various aspects within the context in which they occur":

technology is a multi-faceted entity. It includes activities as well as a body of knowledge, structures as well as the act of structuring. Our language itself is poorly suited to describe the complexity of technological interactions. The interconnectedness of many of those processes, the fact that they are so complexly interrelated, defies our normal push-me-pull-you, cause and consequence metaphors. How does one speak about something that is both fish and water, means as well as end? That's why I think it is better to examine limited settings where one puts technology in context, because context is what matters most.⁴

Many layers of context form the backdrop for this study. The Canadian context includes challenging weather, great distances spanned by innovative communications, traditions of educational accessibility, respect for diversity, and the struggle to maintain a distinct identity. This paper brings a Canadian perspective to the issue of women and learning technologies, though the research includes experience within and outside the country.

We hope that our exploration of technology in contexts ranging from ABE classrooms to streambed investigations to boardroom workshops will prompt readers to do the same and to reflect on how opportunities presented by new learning technologies can become a reality for women.

Endnotes to Section One

1. Terry Evans and Darryl Nation, *Distance Education Futures, Selected papers from the 11th Biennial Forum of the Australian and South Pacific External Studies Association*, 1993.
2. Ursula Franklin, *The Real World of Technology*, CBC Massey Lectures, Anansi/CBC, Toronto, 1990, p.12.
3. Josée Normand, "Education of Women in Canada," *Canadian Social Trends*, Winter 1995, p.20.
4. Ursula Franklin, 1990.

Section Two

Access: A Key Issue for Women's Learning

Overview

Access to learning can be understood in two ways: **physical access** is the availability of learning at times and places suitable for the learner; **social access** involves conditions that meet learners' needs for appropriate content and a supportive environment. This section focuses primarily on physical access and considers how new learning technologies link into what is termed the "access chain": communications infrastructures, institutional systems, community resources and individual learners. As well, the expectations and decisions that shape the technical systems within that chain are examined, as are some cost issues though these are discussed in greater depth in the next section.

Social aspects of access considered in this section include institutional initiatives to overcome barriers to learning but some social access is explored in greater detail in the section on equality and quality of learning.

Factors that determine whether or not learning is truly accessible are related to geography, communications and transportation systems, social and economic situations, gender and language.

Background: What are our expectations of access?

Living in a geographically dispersed and culturally diverse country, Canadians have a particular perspective on access. We have come to expect some basic standards in access to communication and transportation as a means of allowing citizens to participate in the political, social and economic life of the country. We expect that we can mail a letter anywhere in the country for the same priced stamp, that we can have a telephone at affordable rates and, in most parts of the country, that the road that goes past our house connects with a network of roads and highways across the country.¹

Access to education is equally a part of the rights we expect as citizens. In Canada, the first country in the British Empire to establish public education, the rationale for accessibility has been shaped by several enduring principles, one of which dates back to 1841. Egerton Ryerson argued that universal access to education was essential so that Canada would not be "a nation of hewers of wood and drawers of water,"² i.e. not be confined to a colonial and dependent role as shipper of raw materials to Britain and recipient of its manufactured goods. Ryerson's vision, to prepare people to contribute to the political and economic life of the nation, is still a guiding rationale for providing access to education.

The benchmark of what constituted an adequate education has shifted over the past 150 years, generally in tandem with the demands of the economic system. In the earlier part of this century, when the economy was dominated by agriculture, grade school completion was regarded as adequate for most people. In the 1950s and 1960s, high school completion became the normal expectation. By the 1990s, we have heard

repeated statements that the new "information economy" requires at least 17 years of education. It is not the purpose here to argue with this rationale but to note the growing assumption that increased levels of education provide better preparation for participation in the workforce.

Removal of Barriers

Barriers to learning can be considered from two sides. Lack of access can be regarded as a fault in the system or as problem due to a deficit in the learner. How access is viewed affects notions of responsibility about how it should be addressed: it is either the system's responsibility to remove the barrier or the learner's responsibility to overcome the deficit that makes learning inaccessible.

For example, post secondary institutions have fairly recently accepted the responsibility of making education accessible to learners with disabilities. Previously, it was regarded as the learners' responsibility to manoeuvre through a campus despite stairs, heavy doors, inaccessible washrooms, long distances between buildings and so on. This shift is an example of two relatively recent changes: an expanded general concept of what is meant by accessibility, and a shift in responsibility to the institution for removing barriers to the learner.

Understanding the "two-sidedness" of access makes it easier to recognize when expectations have been reduced or more responsibility has been shifted to learners. For example, requiring students to have Internet access to contact their instructor when they could previously telephone a 1-800 number shifts responsibility to the learner. Learners without Internet access would see this as an institutional barrier, but the institution may see it as something the learner must address.

Access for Women

Women's access to learning is constrained by limited time due to family and work commitments and, in many cases, by social expectations and limited finances. For many, distance from educational providers and lack of local programs are barriers because women typically are less able to move or travel to locations where programs are available. Limitations in previous education can also present challenges, notably in language, math and science.

The job market rationale for education traditionally did not apply to women whose education would be "wasted" if they opted to raise a family instead of joining the workforce. We probably all know families who invested heavily in their sons' education, encouraging their daughters to finish their formal studies quickly and acquire useful skills (like typing, or training in nursing or education) so they would have something to fall back on if marriage did not provide lifetime economic security.

In addition to the above women who may be seeking a "second chance" at learning, there are others who want to pursue further qualifications and/or obtain job related skills. There are also those who regard nonformal learning as a lifeline when dealing with personal, social and community issues. For all of these women, access is an important consideration.

Women's access to learning through part time and flexible programs

Many women accommodate learning within the other demands of their lives by taking advantage of the flexible arrangements offered by part time, open and distance education. Statistics Canada reports that almost 200,000 women were attending university part time in 1992-93, accounting for 63% of part time undergraduates. Moreover, 60% of women students aged 25 to 29 were part time learners, and 87% of women students aged 40 to 44 studied part time.³ As well, women account for between 60 and 70% of the 400,000 distance learners in Canada.

Women's high use of part time and flexible learning clearly demonstrates that many women need flexibility of time and/or place for learning. At present, it does not appear that the new technologies play a major role in increasing access for distance learners. In 1994, only 19% of the 400,000 distance learners were using an information technology-based medium, such as teleconferencing, the Internet, or multi-media. This means the majority were using print, video and audio materials and telephone communication.⁴ However, many educational providers are exploring the use of new learning technologies, and, in some cases, there is special funding for their use in pilot projects while there are cuts to funding elsewhere. This raises the possibility that the use of new learning technologies, because of limited availability, high cost, or displacement of more flexible programs, could in fact reduce access to learning for those who are most dependent on part time and flexible programs.

Educator Provision of Access

Another expectation that has shaped our understanding of access is that the educational provider has some responsibility to provide access, especially to learners in remote areas. In the early part of this century, many provincial education departments set up correspondence education systems to enable children to learn at home. Many of these programs are still going strong, serving younger students in remote areas, those who choose to study at home and, increasingly, some adult learners who want to complete elementary or secondary school programs.

This expectation goes beyond the level of compulsory education. Universities with a mandate to serve an entire province, such as the Universities of Saskatchewan and Alberta, set up programs in their early years to provide access both to formal and nonformal learning. The University of Saskatchewan, for example, took The Good Farming Train to community railway sidings, providing nonformal education in farming practice and home economics.

A number of other post secondary institutions offered formal courses by correspondence, in which learners followed a written program of studies and communicated with their instructor by letter. These programs were often the only option for learners, because of remoteness, disability, lack of funds, or family commitments, and no doubt were challenging and often isolating experiences for individual learners. Nonetheless, many people successfully completed their qualifications in this way.

Many of the early correspondence programs provided a basis for developments in distance education. In recent decades, systems have been enhanced by improved materials, more learner support, and use of a broader range of instructional approaches and media. The new technologies and systems should not

provide less access than those already in place. The old systems can serve as a benchmark for the new ones.

The Four Levels of Access

The systems that affect access to learning can be considered as links in a chain, with the proverbial caveat that the system is only as strong as its weakest link. Elements of this access chain are outlined here. Basic explanations of the various players' roles, including those "behind the scenes," are needed in order to understand how their decisions affect educational access.

Let us begin with a fairly familiar example: print based correspondence courses introduced shortly after a postal system was established. This example demonstrates that four levels of systems must function effectively to have genuine accessibility. Firstly, there needs to be a reliable postal system (the infrastructure level); secondly, an educational provider willing to offer a course by correspondence (the institutional level); thirdly, reasonable access to a post office for the learner (the community level); and, finally, a learner whose situation permits enough time to study, light to read by, and so on (the individual level). Considering each of these levels in turn, we can examine how they relate to learning technologies, old and new.

The Infrastructure

The basic transportation and communication infrastructures established during the past century are still factors in access to learning, as well as to many other services. Those who travel to class depend on reliable transportation, whether by private car or public systems, and conditions that permit safe travel in most weather, such as well maintained roads. Those that study at a distance rely on postal or courier systems to deliver materials intact and on time, and on the telephone system to contact their instructor, the library, the bookstore and other learners.

Newer learning technologies require more from some parts of the infrastructure. For example, while the use of audioconferencing to transmit voices requires only one regular telephone line, the addition of computer generated graphics requires the addition of one or more lines, or more "bandwidth" on a telephone transmission system. Bandwidth refers to the amount of data that can be transmitted through a telephone line. Data such as letters or numbers can be sent using a narrow bandwidth while images, photographs, colour, etc., require more capacity. According to A.W. Bates, "telecommunications capacity is a combination of bandwidth and speed of transmission."³

Many of the newer technologies require a significant amount of bandwidth. Most videoconferencing requires transmission lines with more capacity than an ordinary telephone line, depending on the system and the quality of the image being transmitted. Computer-based material that has extensive graphics and complex structures, such as much of the material on the World Wide Web, can take a significant time to transmit depending on capacity of all the systems involved from the telephone system to the Internet provider's system, to the modem and line capacity of the user.

Another part of the infrastructure system that deserves mention is the electrical power system, which can

be unreliable in parts of the country. Virtually all the new technologies require reliable and consistent electrical power.

Provision and regulation

As part of a range of national initiatives to support the expanded use of "new information technologies," both government and private sector agencies have made commitments to enhance the communications infrastructure to support what is generally termed "broadband access." Since the Canadian communications infrastructure is a complex set of systems entailing networks of land lines that carry phone and cable signals, satellite transmissions, voice and broadcast signals, high powered transmitters, and short wave, this endeavour represents a complex interconnection of both private and public sector agencies. One of the major players, Stentor, the alliance of major Canadian telephone companies, has announced that it plans to spend \$8-10 billion to provide broadband access to 80% to 90% of businesses and homes by 2005.

According to a report prepared for the Information Highway Advisory Council, 95% of Canadians have telephone service but as of August, 1994, about 275,000 households had only party line service.⁶ The only region where all subscribers have private lines is Saskatchewan, where SaskTel now provides single line service to all its customers;⁷ Manitoba Tel planned to convert all party lines to single lines by 1996.⁸ Those that want to use a computer for communication and exchange of information must have access to a private telephone line.

In some regions of the country there is no basic telephone access and in others there is no access that would enable the use of a computer for communication or transfer of information. And while 80% of the country may eventually obtain broadband access, it is worthwhile to examine which regions will obtain access first, and to find out about the 20% that will be left out.

The federal government articulates communications policy and the Canadian Radio-Television and Telecommunications Commission (the CRTC) sets up the rules and regulations to carry out this policy. Until the fairly recent past, the general direction of policy was to address Canada's vast geography by distributing throughout the system as a whole some of the costs of communication to more remote regions. However, with the advent of deregulation and of new communications providers, especially long distance services, there has been a shift both in policy and in regulation towards more "cost recovery" on each kind of service. This means that the cost of communication is likely to be higher in more remote or less populated areas, and that the cost of local service will increase since telephone companies argue that revenues from long distance have subsidized local service.

It is more than likely that those who live in urban areas are going to have access to the broadband systems first because their larger populations can provide a return on investment. Those in more remote or less populated areas will receive this service much later or not at all, or at a cost far greater than that paid by urban residents. As one example, BC Tel quotes charges for the broadband system known as ISDN as follows: for those within 4 km of a BC Tel central office, \$55 monthly charge and a \$60 one time installation charge; for those beyond 4 km of a BC Tel office, a \$75 monthly charge and a \$100 one time installation charge.⁹ This compares to a current monthly basic phone rate of about \$16 to \$22.

While these developments are proposed as a means of providing greater access to new technologies, the impact may in fact be to limit access if this enhanced service is not universally available or affordable. Educational providers must face this question as they consider the use of various technologies and the learners they intend to reach.

Institutional and Organizational Systems

Educational systems pick up where the basic infrastructure systems leave off. For example, learners taking part in on-site programs expect a safe location and reasonable access from the parking lot or bus stop to the classroom, and distance learners expect the institution to provide them with the materials and support they need to be successful in their studies.

Learners also expect educational providers to address some basic social access. They expect to be able to contact registration and counselling staff and instructors in person or over the phone and they expect that the learning environment will be hospitable, support their needs as learners, provide relevant and appropriate education or training and offer fair and equitable assessment of their learning achievements.

Distance education experience demonstrates that provision of access is far more than delivery of information. The quality of the teaching/learning interaction among learners and instructors or facilitators, access to library and other resources, assistance with study skills, and access to academic and personal counselling are essential for a successful learning experience.

Addressing social barriers to learning

Many people have had limited opportunities to learn earlier in their lives, due to social factors such as gender, income, class, race, language, ability. In addition to the tradition of providing physical access to learning, a number of educational providers offer either mainstream or special programs to serve those whose access to learning has been constrained by social barriers.

Customized programs offered by Canadian education institutions for learners facing social barriers reinforces the principle that providing access means more than simply providing a course or a place; it also includes services that help students achieve success. These include academic and personal counselling, community based support systems and prior learning assessment.

These systems rely far more on committed and competent staff than on technology. As Dr. Ross Paul, president of Laurentian University, comments:

If institutions ... are to be more successful in the future in attracting and keeping disadvantaged students, they must emphasize practical solutions to overcoming barriers to learning faced by specific populations, rather than attempt to apply a fixed technological solution to every problem. ... This demands an institution that is flexible, open and forever questioning the way it operates. An open university will not live up to its name very long if it institutionalizes its technology—if, as is so often the case, its way of doing things becomes as rigidly applied as traditional classroom teaching.¹⁰

Accessibility, budgets and technology

While some new technologies offer the potential for increased interaction and flexibility for learners, virtually all new technologies require increased investment in staff time. For example, computer conferencing can be used for ongoing discussions that enable learners to build on each others' knowledge and experience, but this medium also requires significant staff time to structure and facilitate the conference, as well as an investment by learners in access to the technology. If this technology is introduced to save time and money, it may be disappointing on that score.

The challenge at the institutional level is to take advantage of new technologies without sacrificing the interests of those whom the institution has traditionally served. While some may make special provisions to ensure technologies are available, others may find it difficult to maintain existing, accessible programs and meet the staffing and budget requirements of new technologies, especially in the current climate of cutbacks.

Some institutions may resolve this by deciding to serve only those who have access to the new technologies, with the risk that there will be "have" and "have not" learners, and "have and "have not" educational providers, in terms of those who can afford and use new learning technologies and those who cannot.

While many educational providers are investing in new technologies, a number of questions remain about how these are to be used and whether they will improve accessibility in the long run. Here are some specific questions that can be addressed to these providers:

- Who will have access to programs offered by this technology, and how does that compare with who had access before this technology was introduced in terms of numbers, gender ratio, location, financial requirements, and so on?
- What has been invested in this technology, and will this cost be covered by sponsors, by learners, or by the institution?
- If learners are required to have access to a particular technology in order to take a course or program, how can they gain access to this technology and to training in how to use it?
- What support is available to help educators learn to use this technology for instructional purposes?
- What is the total investment in computers and software at this institution? What is the investment in part time instructional staff?

Community Level Access

Continuing along the access chain, local communities have two linkages: to infrastructures, such as communications systems, and to educational providers beyond the community that may use community facilities to deliver programs locally. As well, larger communities with their own educational institutions may serve as a hub for smaller communities.

Community learning facilities

The idea of a community facility that serves as a venue for a variety of learning programs offered by a number of different educational providers, distant and/or local, is one that has been introduced with varying

degrees of success in Newfoundland, New Brunswick, Quebec, Ontario, Saskatchewan, and British Columbia. As well, northern communities in the territories are developing learning sites, and various networks of learning sites are being set up in aboriginal communities. How well community facilities are used, and by whom, and to what extent they meet the needs of learners, depends on an array of factors ranging from internal community politics to the location of the building.

At the community level, there is a possibility that technology needs will increase over time. In the 1980s, basic equipment for the first Contact North learning sites comprised audioconference equipment, fax machines, and a computer for the local site facilitator.¹¹ Now, most Contact North community learning facilities have conferencing equipment (audiographics and/or videoconferencing) and computers that can provide learners with Internet access.

There is also the question of how many sites are enough to meet local needs, and which communities receive which type of service. Learners in one major prairie city travelled 200 km once a week in winter conditions to reach the location of a videoconferenced class delivered from a third prairie city. The example raises the questions of why the learners' home city of 60,000 people did not have access to videoconferencing and whether the learners, if asked, might have preferred local access to audioconferencing rather than driving that distance to videoconferencing.

New technologies and community access

With the advent of SchoolNet, the federally initiated program to link all schools and libraries to the Internet by 1998, there is increasing interest in having public access to the Internet in more and more communities.

Local libraries or schools may agree to offer access to the public, but there must still be sufficient resources available to provide a reasonable number of well equipped computers and staff (volunteer or paid) to help train learners. An initiative, supported by Industry Canada, is the Community Access Program in which communities submit applications for up to \$30,000 to establish a community access facility enabling residents to use computers with Internet access. However, the emphasis of CAP appears to be more on business related uses of the Internet than on adult learning. As well, CAP's information materials and application process make no mention of access issues for any equity groups.

In whatever situation, having equipment available is just the first step. It may take a concerted effort by learners and facilitators to make sure a community facility provides access to learning and offers the privacy and uninterrupted use of equipment that learners need. As well, training in computer use works best when it is adaptable to the needs of the learners, rather than a "one size fits all" approach. Women have reported they feel more comfortable when working with other women, and when having an opportunity to explore for themselves how a system works rather than simply be given directions.

Internet Service Providers

Another aspect of access relevant at the community level is that of Internet service provision. An Internet service provider (ISP) maintains the linking systems (computers, phone lines and software) that serve as the bridge between the individual computer users' modem and the network of networks that is termed the Internet. Although there are increasing numbers of cooperative, public and private ISP enterprises, access

to the Internet is by no means ubiquitous in Canada. Those who have no local ISP have to dial long distance to reach one, which can be very costly.

Although many ISPs are at present small enterprises, they could be amalgamated into much larger corporations, much as local cable companies merged into large companies during the past two decades. Local monopolies in Internet access may have the outcome of increasing costs to the user, thus limiting access.

There is also a question about what type of Internet will be available in the future. Plans are well underway for academic institutions, the original main users of the Internet, to set up their own Internet, (dubbed Internet II), possibly leaving behind the increasingly commercialized supermarket of infomercials that bulk up the World Wide Web.¹² It is not possible to determine what this will mean for access to learning opportunities via the Internet, but it seems likely to complicate the situation for some time.

Personal Access

From the learner's perspective, factors that affect access to learning opportunities emerge from the following series of questions:

- What learning do I want to pursue?
- Is it available in my community, at a time and place that make it possible for me to participate?
- Is it available to me by distance education, in a format that makes it possible for me to use?
- Can I afford it?
- Do I have the time to do this? If there are competing demands of family or work, will I be able to negotiate sufficient time?
- Are there other factors, such as my previous education, my first language or my ability, that affect my eligibility or ability to participate?
- Will the learning program meet my needs as a learner?

While learning technologies, old and new, can help with some personal access issues such as the need to study on a flexible schedule, they cannot help with others, such as limited finances or insufficient time to study. Lack of confidence or an unsupportive family are barriers to learning that need to be addressed with the help of human support, rather than new learning technologies.

In some situations, newer learning technologies can make personal access more complicated. For example, access to single telephone lines and reliable electrical power is not a given for a significant number of Canadian households. Access to computers cannot be assumed. In many locations, if computers are available in public facilities, they may not be equipped with communication technology or for Internet access.

Language is also a major consideration for computer communication as English is the dominant language of the Internet and of many communication systems. One report prepared for IHAC notes that text based messaging and other software do not readily accommodate languages other than English, and that material in aboriginal languages in particular cannot be readily exchanged over electronic networks since

their scripts cannot be written in the digital code used by most computers and networks.¹⁴ Even Canada's official language, French, is not well supported on the Information Highway. The final report of IHAC comments that "the availability of French language materials, navigational tools and compatible standards for their distribution is very limited and must be encouraged."¹⁵

Who has Access to Technology?

In this section we provide a brief sketch or statistical overview of the extent to which Canadians use and/or have access, both at home and at work, to computer technology and other technologies that affect access to learning. Where possible we have reported these data for women; where these data were not readily available we have tried to extrapolate implications for women given other known data.

Women's access to new computer technologies still lags behind men in many important areas. Women's access to the new technologies is a product of the social forces that affect educational choices, labour force participation, occupational segregation and, relatedly, income levels and family patterns.

Who has Computers?

According to the Statistics Canada Household and Facilities Survey 1996, of approximately 11.4 million Canadian households some 3.6 million, or 31.6%, have a home computer, up over 10% from the previous year. Not surprisingly, data show that those with higher incomes are more likely to have computers.

However, the data show increases in computer ownership in both higher and lower income levels. In 1995, 53% of those with incomes over \$70,000 had computers and 11% of households with incomes under \$15,000, whereas in 1994 the numbers were, 45% of the highest income households compared to 9% of households with lower incomes.

Families with children are more likely to own computers (35%) than those without children (25%) or one person households (12%) (1994 Household survey). Although this data is not broken down by women-led households, data for lone parent families (1995 Household survey) can serve as a proxy. In 1995, only 22% of lone parent families with children under 18 had a home computer; whereas 44% of single family households reported computer ownership.¹⁶ The proportion of households with home computers varies across the country. For example, in Alberta and British Columbia, 38% of households have home computers; 22% in Newfoundland and New Brunswick.

Who uses On-line Services?

About half of computer owners also have a modem, the linking equipment required to access the Internet. But in the 1.8 million households with computers equipped with a modem only about one quarter actually access the Internet at home. In the 1994 Household and Facilities Survey, 22% of men and 14% of women with home computers reported that they had used online services.

Use of online services translates into increased hours of computer use for both women and men although women report using the computer fewer hours than men. For those using online services the average

number of hours of home computer use per week was nine hours for men (compared to six for men without online services) and seven for women (compared to five for those without online services). More households in Alberta and British Columbia access the Internet than do Canadians on average, 10% as compared to 7.4%.

Who uses Computers at Work?

As our respondents noted, it is through work that many people first begin using a computer. The 1994 Statistics Canada General Social Survey reports that almost 48% of Canadians use computers in the workplace, up almost 15% from 1989. More women (52%) than men (44%) reported that they used computers at work, which reflects their concentration in clerical occupations.

Statistics Canada defines high computer use occupations as where over 60% of the workforce reports using computers. For women, the top four high computer use occupational categories in 1994 were management/administration (28%), library/clerical (25%), bookkeeping/accounting (15%) and teaching (14%); 18% of women reported using computers in "other" occupations. For men the occupational breakdown is management/administration (48%), teaching (10%), architecture (8%), life sciences/mathematics/systems analysis (7%), electronic data processing (6%); 21% of men reported using computers in "other" occupations.

Education and Computer use

For both women and men computer use at work increases with educational attainment; about 70% of those with a university degree reported using computers at work.

Computer use is high among educators, although women educators are less likely than their male counterparts to use computers at work. For example, 89% of male elementary and secondary teachers report computer use at work compared to 61% of female teachers in this category. 46% of male teachers and 26% of female teachers have used computers in advanced areas (for example, using computers for data analysis).

When asked about online services at work, 41% of male teachers as compared with 15% of female teachers reported using these services. It is likely that these figures reflect the distribution of teachers in the elementary and secondary school panels as well as the lower representation of women in school administration.

Household Access to Other Technologies

Data from the 1994 Household and Facilities Survey show 400,000 Canadian households with a fax machine and 75% of Canadian households with cable service. In 1993, Statistics Canada reported 3% of Canadian households had a satellite dish.

Some Questions About Access

There are some specific questions that can be addressed to decision makers in the community, in educational institutions, and at provincial and national levels about access to learning for women.

- What is good access to learning opportunities? How does that compare with what is available in the community?
- How well are proposed community access learning centres serving adult women learners, whether provided by local or provincial agencies or through SchoolNet or the Community Access Programs?
- Who has access to the Internet in my community? Are there age and gender statistics?
- What training is available for users at the local community learning or access centre? How accessible and friendly is it for women learners?
- How does access to learning now available in my community compare with what has been in place? Are technologies being used to replace on-site classes, or are they providing learning opportunities that weren't available before?
- What must be invested personally, in time and money, to obtain access to learning that meets a learner's needs? Does this type of learning require using new learning technologies? old learning technologies?
- What plans are in place to provide broadband telephone access to my community? What will it cost the user when it is in place?

Endnotes to Section Two

1. Each of these expectations has been challenged recently. Reports on Canada Post argue it is not economically rational to provide first class postal service anywhere in Canada for the same cost; CRTC regulations now support cost recovery on separate elements of telephone service (a process termed unbundling of rates), and toll roads are becoming a more popular way of covering highway costs.
2. Speech on the occasion of the opening of Victoria College, Cobourg, later Victoria University, part of the University of Toronto.
3. Josée Normand, "Education of Women in Canada," *Canadian Social Trends*, pp.19-20.
4. Jeffrey Frank, "Access to Technology in Canada," *Canadian Social Trends*, Autumn 1995, p.7.
5. A.W. Bates, *Technology, Open Learning and Distance Education*, Routledge, 1995, p.89.
6. IHAC, *Access, Affordability and Universal Service on the Canadian Information Highway*, 1994.
7. Ibid, p.8.
8. SaskTel and Manitoba Tel have been operated as provincial government crown corporations, which

calls into question the oft-repeated dictum that the private sector is better equipped to provide services on a businesslike basis. Manitoba Tel was privatized in late 1996.

9. BC Tel website, November 1996.

10. Ross Paul, "Access and Equal Opportunities: Strategies to Realize our Pious Aspirations (A Canadian Perspective)," proceedings of *The Student, the Community and the Curriculum: International Perspectives on Open and Distance Learning*, sponsored by UK Open University East Anglia and Empire State College, Sept. 1991, p.213, 215.

11. Contact North is a provincial initiative to provide greater access to learning for residents of northern Ontario.

12. Robert Everett Green, "US Universities announce birth of new baby, Internet II," *Globe and Mail*, Oct. 17, 1996.

13. Heather Gordon and Lynn Hauska, Sunshine Coast Women's Centre Online, WomenSpace, April, 1996 and WomenSpace is a Canadian-based virtual network that aims to promote accessibility to the Internet, its tools, information and resources, to enhance effectiveness through national and global connections.

14. IHAC, *Access, Affordability and Universal Service on the Canadian Information Highway*, p.10.

15. IHAC, *Final Report*, p.63.

16. Jeffrey Frank, 1995.

Section Three

Costs and Use of Resources

Overview

Cost questions can be examined within a framework of values about learning. This section begins by exploring some of the values underlying funding decisions, especially for adult education and training. Costs involved in new learning technologies such as monetary investments and human resources are considered at the levels of national infrastructure, educational provider, the community and the individual.

What this section does not provide is a complete cost picture of new learning technologies. Even if it were possible to develop such a picture, given all the variables and unknowns, it is beyond the scope of this paper to do so. Instead, by presenting some of the types of costs, it becomes easier to uncover the underlying values behind financial decisions and their implications for women's learning.

Values and Costs

A suggested way of approaching cost issues is to convert them into questions about comparative values. We can think about what else a certain amount of money could buy or compare costs with alternatives that achieve the same or similar outcomes. For example, when we read that the local school board has invested \$500,000 in providing computers for school administrators, we might ask how that compares with the salary of three special education teachers just declared redundant.

In another example, Heather Menzies, in *Whose Brave New World*, notes that one year's investment in information technology by the federal government would pay an annual salary of \$40,000 to 90,000 people.¹ This approach is in contrast to that of accounting which sets up different categories for costs for equipment (usually capital costs) and costs for people (usually operating costs), an arrangement that does not readily allow for comparisons based on values.

Who Pays for Education and Training in Canada?

It has been generally accepted in Canada that the cost of educating "the young" (usually defined as those pursuing elementary and secondary education with their age cohort) should be a public expense shared by all taxpayers, rather the individual financial responsibility of families. The levels of education that are publicly funded have gradually increased along with expectations of what is considered an adequate education, from grade school completion in the 1940s to high school completion in the 1960s. In the mid 1960s to mid 1970s, college and university education was made more affordable through a system of grants and loans. At the same time there was a rapid expansion of the post secondary system across Canada; the number of universities virtually doubled between the 1950s and 1980s and a large portion of the community college system was established.

Public funding for the expansion of the post secondary system has apparently reached its limits. Federal

grants have been curtailed over the past decade, making less money available both for maintaining the institutional system and for providing financial support for individual students.

Adult Education and Training

In contrast to the general consensus about educating the young, there are a range of beliefs about who should pay for education and training of those who are beyond what is considered "school age." These programs include what is variously called adult education, continuing education, adult retraining, and adult upgrading. The number of people served by these programs is significant; according to Statistics Canada's Adult Education and Training Survey (AETS), about 35% of the Canadian adult population took courses or received training in 1993.²

To some extent, the balance of costs between society and the individual learner depends on how education is regarded: as a personal and economic benefit to the individual, as the right of every citizen, or as a common good for society as a whole. Many post secondary institutions have a longstanding tradition that costs of continuing education are shared between the provider and the learner on the grounds that it is part of the institution's mission to serve the population whose taxes support it. But this has changed dramatically over the past ten years, with increasing demands that continuing education programs not only recover direct costs but return a profit to the institution. Some continuing educators feel the move towards profit making is a betrayal of public educational institutions' social responsibility; others feel it is a realistic response to a changed funding climate.³

To increase revenues, post secondary institutions are increasingly seeking "partnerships" with the private sector in a variety of arrangements ranging from those in which the institution provides programs customized to meet the training needs of a particular company or industry to those in which the institution obtains special rates for a corporation's product or service, such as computer software or long distance telephone access.

There has also been a mix of approaches to funding in the field of retraining and adult upgrading. In the 1960s and 1970s, there was an increase in government funded programs as part of the rapid expansion of publicly supported community development initiatives. Since then, funding patterns have changed according to the political tenets of the day.

In place of "block funding," which enabled providers to allocate funds according to local priorities, funding has been more and more directed into particular types of programs. In some years, funding priorities seemed to stress basic literacy and numeracy; in others, it was training in advanced technology to meet the anticipated demands of an economic system based on "knowledge workers."

In some sectors, employers have covered or shared with employees the cost of job-related training, but employer groups have also argued that public education should provide graduates with the skills they need for the workplace.⁴

Funding for New Technologies

While basic funding has been reduced in continuing education, adult education and training, there has been increasing support for the use of new learning technologies. This is sometimes done without determining the advantages of using technology or without any provision for comparison between programs using new learning technologies and those that do not.

Funding for new learning technologies tends to be targetted, meaning that it is a priority for educational providers to use a specific technology. What programs are offered and to whom are less important factors than the technology itself.

There are a number of levels of costs for education and training, and new technologies require additional expenditures. Traditional costs for education and training include:

- macro level costs of building and maintaining an educational system;
- intermediate level costs of operating an educational institution, and of supporting community learning centres and local programs;
- the costs to a particular provider of offering specific programs or courses to specific populations;
- costs to the learner for fees, materials, travel to an educational institution, and reduced income if paid employment is curtailed for study time.

The costs of adding new technologies include:

- the cost of national and local infrastructures to support the use of educational technologies (electronic communications and transmission systems);
- costs to the institution to use these technologies (equipment acquisition, system development, training of staff and faculty);
- costs to the institution of developing specific programs and courses using learning technology;
- costs to the learner of obtaining access to these technologies (cost of computers, software, line charges, etc. and/or cost of travel to sites where technologies are available).

Some Examples of Infrastructure Costs

It is difficult to estimate the total cost of establishing the infrastructure that supports new technologies or to determine what proportion of it can be attributed to using new technologies for learning. For example, the Information Highway is used for a wide range of purposes and its development is funded by a broad range of public and private sector investments.

SchoolNet, the computer based communication systems that is expected to be connected to all schools in Canada by 1998, represents an investment by the federal government of \$52 million over four years. In

addition, there are provincial government investments to provide computers and other technological support systems in schools. In British Columbia, the provincial government is investing \$100 million over five years and in New Brunswick, \$10.5 million will be invested over five years in TéléEducation New Brunswick, of which \$6.1 million is to establish and maintain the technological and organizational infrastructure, and \$4.4 million is to support up to 50% of the costs of developing courses for distance education.⁵

The initiative by Stentor, called the Beacon Initiative, to upgrade 80-90% of local telephone networks to broadband lines by 2005 will cost \$8-\$10 billion.⁶ However, investment in enhanced systems will be based on potential rate of return in accordance with new CRTC policy stipulating that rates for specific services to specific regions be set at cost recovery levels. Unless interventions by government or other agencies subsidize the cost of serving smaller and/or more remote communities, populations that can cover the cost of enhanced service will receive it first, while other communities may not receive it at all or will face considerably higher costs.

The Canadian Network for the Advancement of Research, Industry and Education (CANARIE), a federal/industry coalition to explore applications of the new communications and information technologies, projects an investment of about \$900 million in public and private sector funds in network upgrading, product development, establishment of a test network, and its own administration.⁷

Who is paying for all this?

In many cases, the public will be paying for the costs associated with building advanced communications, whether through the private or public sector, and these costs will show up on our tax bills, phone bills or cable bills some time in the near future.

There appears to be no immediate plan by the public or private sectors to ask Canadians whether there is something else we might rather do with the money invested on our behalf in the communications infrastructure. Unlike the concerted public outcry that met the Canadian cable companies' 1995 move to "negative option billing," there has been little public debate about these expenditures.

Institutional Costs

It is somewhat easier to pin down the costs of new learning technologies at the institutional level because educational providers tend to track their costs quite closely. This means there are some points for comparison in estimating additional costs for new learning technologies.

For example, educational institutions with established distance education programs usually have specific budgets for serving their students using a variety of technologies including print, audiotape, telephone, teleconferencing, videoconferencing and computer conferencing. A number of internal cost studies have demonstrated that costs for serving students using "older" distance technologies were equivalent to, and sometimes lower than, the costs for serving on-site students. The costs for distance education are also much lower than providing travelling instructors unless there are special funding arrangements in place and/or costs are shared between the host community and the educational provider.

The costs of the newer learning technologies tend to be considerably higher than the costs of technologies used to provide flexible and open learning. For example, the capital costs of basic equipment for audioconferencing, which allows learners and instructors in different locations to have a direct conversation, have been estimated at \$5,100 per site, increasing to \$10,200 per site for audiographics. But it costs \$20,000 to \$30,000 per site for interactive videoconferencing that uses phone lines.⁸

Operating costs

In general, technologies providing real time transmission, especially those that require multiple lines or broadband systems, have substantial ongoing costs whether for telephone, cable or satellite systems. These costs increase with the numbers of sites served whether there are two or thirty students at that site. Long distance charges are a significant part of technology-based communications relying on phone lines, especially those that require broadband to transmit video and computer graphics. Satellite transmission of video entails ongoing costs for the use of satellite time.⁹

Line charges are such a significant cost factor that a consortium of Canadian educational institutions presented a brief to the CRTC requesting a change in regulations so that phone companies could set reduced tariffs for educational purposes. In September 1996, the CRTC determined that telephone companies could provide reduced rates for educational purposes, but stipulated so many conditions it is doubtful whether any educational institution would be eligible.¹⁰

By contrast, technologies that do not provide real time interaction may be lower cost in the long run. Computer conferencing, in which messages are sent on a delayed basis (called "asynchronous" transmission), can be significantly cheaper than audio or videoconferencing. At present, computer based communications systems are generally lower in actual transmission costs, providing the computer user does not have to pay long distance line charges to reach a server, and the local Internet Service Provider (ISP) charges reasonable rates.

Staff time

In order to use technologies to provide more flexible learning, the investment in staff time (to prepare materials, facilitate learning and to develop expertise in the medium) is significant. This is the case for all media, but the investment in time depends on the medium used; for example, print and audiotape materials usually take less time to prepare than video or computer based materials. Multimedia materials take a much greater time investment, as do materials designed to be delivered over the World Wide Web. Tony Bates, a recognized expert in the field of educational technology, estimates that preparation time for preprogrammed computer based learning is about ten times that for print materials.¹¹

Sometimes, instructors who pilot educational technologies are released from some assigned work in order to learn the new system and how it can best be used for teaching and learning. Not only can this entail additional staffing costs but instructors often comment that their time investment in the new technology is significantly more than they were officially allocated.

As noted in the section on access, investing in learner support is essential if the program is to provide successful learning. This means allocating staff time for tutoring and counselling as well as for instruction

and facilitation. As well, some new learning technologies require coordination and support from a project manager and technical staff.

Potential impacts on educators

Costs of technology can affect the viability of agencies that do not have technology and increase pressures for cost recovery for those that do. Both of these factors can constrain educational objectives.

For non profit agencies, or agencies that provide learning or training on a cost recovery basis, it may not be feasible to invest in technologies for learning. Agencies serving immigrant populations or literacy providers who typically operate on very limited funds may not be able to accommodate educational technology at all, much less provide sufficient equipment for their learners to use. This can mean limited or no access to grants that require technology, and/or loss of learners to other organizations.

Institutions and organizations that have invested in new learning technologies may face higher costs that must be recovered. A number of observers have pointed out that the cost of materials development for the new learning technologies may well be beyond the means of individual public sector institutions, and that partnerships, either among public institutions or between public institutions and private sector organizations, will be necessary to cover the high development costs.¹² In the drive toward cost recovery there may be a tendency to enrol larger numbers of students than the rest of the system can support in terms of tutoring, study skills and counselling.

Alternatively, institutions may sell courseware to other institutions whose learners may or may not have the same needs as those for whom the materials were originally designed. For example, a business development program for urban learners was subsequently provided on a cost recovery basis to women living in remote northern communities. The material reflected a very different experience from theirs in terms of community situations, social expectations, transportation and communication issues and types of businesses they could operate.

Highly visible investments in new technology may overshadow the less visible but essential human interaction involved in tutoring and advising. Such a skewed picture lends itself to the view that learning is tantamount to delivery and receipt of information, rather than human growth and change. Cost cutters within an institution may be tempted to see the human interaction as expendable, rather than an integral part of the learning experience.

Community Level Costs

In many regions of Canada, governments and agencies have established community learning sites. For example, over 20 years ago Newfoundland set up a system that now has over 200 local centres that can receive teleconferenced educational programs delivered by post secondary institutions, medical educators and school systems. In most cases, governments and agencies external to the community provided funding. Now that there are initiatives like SchoolNet and other programs to establish the broader linkages with the information highway across Canada, it seems likely that local access will depend to a greater extent on community initiative and funding.

There are implications for both cost and access when funding shifts to the community. Typically, externally-funded community learning sites were equipped to receive programs offered by particular educational institutions. For example, if a local college provided programs by audioconferencing, community sites would be provided with audioconference equipment. Community initiated access sites may make their own determination about what equipment is needed, and there may or may not be a match between the equipment at a community site and that required to receive particular programs. In the climate of budget cuts, institutional program commitments can be fragile, potentially leaving a community without programs and with the cost for unused equipment.

Community access sites that provide basic Internet access have costs for space, computers and software, and paid or volunteer staff to provide training and technical support. Under the Community Access Program (CAP) sponsored by Industry Canada, some funding assistance is available to set up these types of facilities at community sites. However, CAP sites are not specifically designated as learning sites; they are intended to serve a number of purposes, especially local businesses. As well, CAP does not require sites to make provisions supporting equitable participation by women, minorities, or disadvantaged groups.

Learner Costs

In many cases, the use of newer technologies tends to shift a greater share of the cost to the learner. Where many institutions previously regarded community education and the cost of outreach as an institutional cost, funding cuts and a shift in priorities has prompted a move toward requiring learners to bear more expense. In some cases, instead of a 1-800 line to phone their instructor, learners now must cover the cost of computer access so they can contact their instructor by e-mail.

Another cost may be travel to a site to receive the program (although learners can participate in some audioconferenced programs from home) and, as noted in the access section, the travel requirement may be significant especially for videoconferenced courses delivered to a limited number of sites because of the cost of equipment.

Individual learners who want to take part in an educational program that includes computer conferencing or the use of the World Wide Web must either have their own computers and software with sufficient operating systems to support full use of Internet access and conferencing, or reliable and regular access to such equipment. They must also have a connection to an Internet service provider.

There are legitimate concerns that the costs for the individual learner can present a barrier to access. Although the number of households with home computers is increasing, investing \$3000 or more in equipment and software is an unlikely priority for many in a time of restricted budgets and uncertain employment.

Comparing Costs for "New" vs "Old" Technologies

Estimating the total costs at all levels of using new learning technologies is a challenging task, but considering an example from a learner's perspective provides some useful information.

An individual learner studying in a formal program by distance education would pay tuition fees and, in some cases, cover the cost of materials which may include a package of print materials supplemented by a videotape. In terms of equipment, she would need access to a VCR to view the videotape and, in most cases, to a typewriter, word processor or computer in order to complete assignments. She would send in assignments by mail or fax and receive written feedback from the instructor; she could contact her instructor by phone, in many cases using a 1-800 number. She would be able to contact the institution's library and order books and resource materials to be sent to her for which she would pay the cost of return postage. In some cases, she may be able to work on projects with other students, using fax and telephone to keep in contact.

Let's see what happens to learner costs when various technologies are added. For audioconferenced sessions, the learner would either have to travel to a site or participate from home in which case she may have to cover the costs of long distance charges. For videoconferenced sessions, she would need a reliable means of transportation to an equipped site and would have to travel in winter conditions since the majority of distance courses are offered between September and April. For computer conferencing, she would need access to a computer equipped with a modem, communications software and Internet access on a frequent and consistent basis since computer conference discussions continue day to day.

If the computer conference is a significant part of the course, the learner may have to negotiate extensive use of the home phone line or invest in a dedicated line for the computer. If she is unable to access a computer for a period of time, it may be impossible to pick up the thread of the discussion. If her employment requires extensive travel, she may need a laptop computer with a modem and may have to cover long distance costs to reach her Internet service provider. If this same course is offered as a computer conferenced multi-media course in which the materials are provided by access to a site on the World Wide Web, the learner would need access to a computer with all the equipment and software necessary for World Wide Web access, and sufficient memory to download the course materials.

This example shows how a relatively straightforward and cost effective course, both for the institution and the learner, can become more costly for both when new technologies are added. For women, who are the majority of part time and distance learners in Canada, these additional cost requirements may make it impossible to pursue the only form of education that was previously feasible for them, especially when family budgets are tight and it is difficult to cover the cost of essentials.

What is the Evidence of Value for Money?

Educational technologies, when first introduced, were frequently compared with traditional face to face instruction which often ignored the reality that the different techniques were used to serve different cohorts of learners. It would be a valuable exercise, now, to carry out a comparison study of the effectiveness of "old" technologies and "new" technologies for similar cohorts.

The effectiveness of open and distance education, one of the main applications of educational technology for adult learners, has proven the value of technologies in providing access to quality learning in many different contexts. But as yet there is very little evidence that the newer technologies are any more

effective, accessible or cost effective than methods that have been used for many decades, such as well-designed packages that may include print, audio and videotape, local tutorial sessions, telephone tutoring, and access to study skills and counselling support on an as-needed basis.

Often, the rationale for using the new technologies is the potential for increased interaction. However, interaction can be provided by much simpler means, such as designing the course in a way that facilitates group work and setting up simple arrangements for communication such as phone or fax linkages. The question is whether the advantages offered by a specific technology justify the increased cost in money and time for the provider and the learner.

Many of the "old" technologies enable learners to study according to their own schedule, allowing for more effective time management and enabling many learners to continue their paid work. By contrast, some of the newer more expensive technologies, such as videoconferencing, require learners to be at a particular site at a particular time, actually reducing flexibility for the learners and often requiring more time commitment.

In many cases, funders can be seduced by the novelty of new technologies and initiate pilot projects without regard to their long term sustainability. Tony Bates observes:

Funds will flow from government and the private sector for educational trials, partly to encourage technological development and hence commercial competitiveness and partly to stimulate services to a point where the take-up of the service makes it economical, or at least justifies earlier infrastructure investments.

It is therefore even more essential that educators ask themselves—and potential sponsors—questions regarding access, costs, teaching purposes, user-friendliness and organizational implications before embarking on projects which may have technological glitz but may not either be valid educationally or economic as a sustainable system.¹³

What else could be done with the money?

An issue to be considered is the "displacement cost": what programs, courses or services are being reduced or cut at the same time that there is increased expenditure for technologies? While a direct relationship between funding cuts in some areas and expenditures on technology may be difficult to prove, these allocations do indicate priorities and choices, and can be examined on the basis of the values that underly the decisions.

For example, William Birdsall comments on a report about a single mother using a computer and the Internet to access a course because she was unable to afford childcare.¹⁴ This situation begs a number of questions, particularly why money was available for computers but not for childcare and whether the mother was forced to consider that her investment in technology was also an investment in childcare since it did not require that she attend classes. There are many other such examples of investment in the use of technology rather than in human services.

Some Questions about Costs

It is a good idea to begin with basic questions such as, "what does this cost" and "who is paying for it?" Further questions can explore costs in terms of values:

- What is the purpose of this investment? To provide better access, more successful learning outcomes (and how do we define success), or to achieve some other goal?
- What is the value returned for the expenditure?
- How can it be demonstrated that educational technologies are achieving the intended goals; for example that they provide better access than the alternatives?
- How can we be assured that the costs of the new learning technologies are "worth it," and can there be an agreed set of values to measure this worth?
- Are the costs of new technologies justified in terms of specific segments of the population who have previously been underserved?
- Is the investment in new technologies the best use of funds? For example, in comparison to subsidizing child care so that women can more readily participate in education and training?

Endnotes to Section Three

1. H. Menzies, *Whose Brave New World: The Information Highway and the New Economy*, Between the Lines, 1996, p.8.
2. R. Bernier, "Distance Education: Beyond Correspondence Courses," *Canadian Social Trends*, Spring 1996, p.22.
3. This issue was debated at the 1992 conference of the Canadian Association of University Continuing Education and prompted intense responses on both sides. A summary of this debate is carried in a theme issue of the *Canadian Journal of University Continuing Education*, Vol. XVIII, No. 2, Fall, 1992.
4. For example, Eric Newell (President of Syncrude), "Business and Education working together to create the system we need," presentation to the Conference Board of Canada's 5th National Conference on Business and Educational Collaboration, 1994.
5. *British Columbia's Electronic Highway*, Ministry of Government Services, 1995, p.1; and (for information on New Brunswick) *Distance Education and Open Learning: A Report*, Council of Ministers of Education Occasional Paper #1, 1995, p.8.

6. *Distance Education and Open Learning: A Report*, p.2, quoted from a Stentor press release, April 5, 1994.
7. CANARIE information kit, Jan. 1994.
8. CMEC, cites Maritime Tel and Tel's estimates, p.38.
9. Those interested in more details about the cost of various technologies for learning should refer to A.W. Bates, *Technology, Open Learning and Distance Education*, Routledge, 1995.
10. *The Information Highway and Canadian Education: Discussion of Issues and Policy Recommendations*, prepared on behalf of the Canadian Educational Network Coalition, the SchoolNet Advisory Board, and the Stentor Alliance, March, 1995; and CRTC Decision 96-9, Sept. 27, 1996.
11. A.W. Bates, p.39.
12. "Responding to the Information Highway," presented to the Working Group on Learning and Training, Information Highway Advisory Council, by the Association of Canadian Community Colleges, Jan. 1995, p.6.
13. A.W. Bates, p.179.
14. William F. Birdsall, "The Internet and the Ideology of Information Technology," paper presented at INET, 1996.

Section Four

Quality and Equality of Learning

Overview

This section explores how technology affects the nature of the teaching and learning process in terms of two closely linked concepts, quality and equality of learning.

Quality, here, is considered in reference to more holistic approaches to learning, including those developed by feminist educators and by practitioners in adult and in distance education. Equality of learning entails looking at whether particular strategies or technologies favour some types of learners more than others, and whether disparities result from intrinsic characteristics of a technology or from choices about approaches and applications.

Perspectives on Learning

Within the broad range of theories about learning, two opposing perspectives are most relevant to this discussion. Ursula Franklin describes these perspectives as the difference between production models and growth models. Production models are based on discrete, controllable processes and outcomes whereas growth models describe more spontaneous processes emerging from the dynamics of human interaction. She notes, "If ever there was a growth process, if ever there was a holistic process, a process that cannot be divided into rigid predetermined steps, it is education."¹

The perspectives used to consider quality and equality in this paper are based on growth models of learning, including feminist perspectives and viewpoints emerging from adult and distance education. Holistic approaches are particularly relevant in considering to what extent new technologies support a full range of approaches to teaching and learning and accommodate different types of learning and differences based on context and community.

Feminist Perspectives

There is a long tradition of philosophical and psychological speculation about differences between men and women's ways of perceiving and understanding the world. Recent concepts are concerned more with gender (the socially framed concept that shapes the different life experiences of women and men) than with sex specific differences related to physiology. What has been termed "women's ways of knowing" has been at the core of an educational discussion for the past 15 years, since the 1982 publication of Carol Gilligan's *In A Different Voice: Psychological Theory and Women's Development*. In Gilligan's terms, gender-related ways of approaching the world result from:

the wish (of men) to be alone at the top and the consequent fear that others will get too close: the wish (of women) to be at the centre of connection and the consequent fear of being too far out on the edge. These disparate fears of being stranded and

being caught give rise to different portrayals of achievement and affiliation, leading to different modes of action and different ways of assessing the consequences of choice.²

Different ways of viewing the world affect how people learn. It has been suggested that the more socially-oriented framework of women's lives fosters a more cooperative approach to learning which values discussion, shared experience, and the opportunity to relate new learning to one's own life and experience.

Adult and Distance Education Perspectives

Many who work in the fields of adult and distance education support egalitarian approaches to learning that respect the learners' experience and allow for integration of learning and life experience. Dorothy MacKeracher refers to the intrinsic drives to human action as: competence (the skills, knowledge and attitudes to operate independently) and connectedness (the sense of belonging in rewarding relationships).³ Aboriginal educators also value approaches that provide for continuity between learning and life and that support social learning strategies based on community values.

Different Learning Tasks

Beliefs about learning processes influence how we approach teaching and learning. There is a specific relationship between learning goals (what you want to achieve) and learning strategies (how you go about achieving it). We make these choices depending on experience and knowledge about what works best, as well as on our perspective on learning.

Rather than attempt to match new learning technologies with the scope of learning goals and strategies, we present some examples that illustrate general principles for exploring the possibilities and drawbacks of new technology.

Learning is never just one discrete activity or process; like any other aspect of human activity it is multifaceted and complex. However, for the sake of discussion, we identify three common elements of learning: **finding information**, **integrating knowledge** and **developing skills**. Using these elements, we can examine how they are supported by learning technologies, old or new, and how that compares with other approaches such as face to face interaction.

Finding Information

In formal education, lectures, presentations or readings provide information and concepts. Libraries provide systematically organized information resources, and learners can also gather information from knowledgeable people in the community. In nonformal education, learners often work cooperatively to gather and share information and apply it to a particular context.

One of the oldest educational technologies, print, is a very good medium for presenting information because it is stable, provides a structure that allows for reference and review, and allows users to process information at their own pace.

These attributes can be used as a benchmark to examine other learning technologies. Audio or videotape allows users to review segments, but not as readily as print does. The more ephemeral technologies, such as radio, video, audioconferencing and videoconferencing, do not allow for reference and review, or permit learners to process input at their own pace.

Computer conferencing allows users to capture, download and print information and use it as they would other print materials. This medium can also be used to share responses to the material, and thus contribute to the further development of information with learners as active participants rather than passive recipients.

The capability of computer conferencing for shared learner contributions is an advantage over print, especially in distance education situations. Achieving the same goals through print would require developing and sharing print materials—easy enough in a classroom setting but requiring the use of mail or fax distribution systems to accomplish at a distance at the loss of the immediacy of response.

On the other hand, transmitting large quantities of information via computer mail requires considerable time to download and print, making it much simpler to provide the material in print in the first place.

The World Wide Web may provide learners with an opportunity to explore a much broader range of information than would be possible to provide in printed textbooks, but it may not necessarily provide the depth of information that can be presented in a large and coherent printed work. Unless there is a framework for selecting information and judging its relevance and accuracy, learners could feel bombarded with information when exploring the Web and be too distracted to focus on the important elements they want to know.

Integrating Knowledge

A significant part of learning involves integration: the development of judgment, social and relational skills, and application of new learning to one's life and work.

Learners integrate new knowledge with what they already know, whether they are mastering a new concept in mathematics or analysing political theory. For many people, discussion and interaction is an important element in the integration of learning. One educator, Sally Haag, has described this as "How do I know what I'm thinking until I hear what it is I have to say?" Another educator commented, "Sometimes we don't know we know as much as we do. Sometimes we don't think that what we know is valuable. When you put it down on paper, and share it, it becomes valuable. It's a form of legitimization. ... Knowledge can be legitimized by sharing it with someone else."

From the field of open and distance education, where learning technologies have been used for several decades, there is significant evidence that women in particular value the interactive, social aspects of learning. This research is relevant in considering the newer learning technologies whether they are used for on site learning or for situations in which learners and instructors are in different locations.

The independent and combined research efforts of von Prummer and Kirkup in two distance education

institutions in Germany and Britain demonstrated the extent to which women learners value social learning and connectedness. Even in an educational context geared more towards individual, self-paced learning with occasional group study sessions (Fernuniversität and the UK Open University) women learners made more use of study centres than men did even though they had to deal with more obstacles, such as child care and transportation arrangements.⁴ Women were more likely than men to involve family and friends in their learning, and the researchers also found that, although equal proportions of women and men felt isolated, far more women than men were bothered by this isolation (40% compared to 24%).⁵

In other research, it has been found that interaction that is mediated by various technologies is valued by women if it provides a safe and non-threatening environment for discussion and reflection.⁶ But interaction does not require new learning technologies. More than a decade ago, a creative distance educator set up arrangements for participants in a women's studies course to communicate by phone and mail. Her extra efforts, more than any particular technology, provided support and encouragement for learners to interact.

Computer mail and computer conferencing are media that can provide for interaction leading to integration of knowledge and the bridging of theory and practice. To work successfully, conferencing requires an instructor or facilitator to provide a discussion framework and to be involved in and comment on the discussion threads as they emerge.⁷

There are examples in which reflective interaction and discussion may be hampered by technology. In one case, a women's studies course offered by videoconferencing raised questions about how to establish a trusting environment that allowed learners to integrate the personal and the political. The challenge was not just that one group of learners were at a distance, but that observers who were not part of the group could "drop in" unnoticed at the other site, perhaps just to observe how the technology was working. There were also concerns about how well the context could be shared among the sites, and that comments could be misinterpreted without a clearer sense of the context in which they were spoken. These concerns about safety, trust, and confidentiality also arise in computer conferences and are particularly pertinent to subject areas in which women tend to be the majority of learners, including counselling, education and health care, where both learner trust and client confidentiality are important issues.

It can be argued that these concerns are not necessarily an intrinsic feature of the technologies and could be addressed by a concerted effort to develop and follow protocols, possibly using some human or technical "gatekeepers." Another issue is that some technologies seem to create contexts in which people suspend inhibitions; this could be an advantage for someone reluctant to speak in a group, but a definite disadvantage when it leads to harassment and stalkers on the Internet.

Skill Development

One of the areas in which technologies were first used for learning was skills development, whether to reinforce reading skills through specially designed print programs or to learn CPR on a Resusci-Annie. One commentator pointed out the extent to which learning technologies have been used to train people to use other technologies, and remarked that there was a fairly natural continuity in this approach, providing

the system was well designed and complemented by a lot of other opportunities for practice and for mentoring.

It has been suggested that women's use of technologies tends to be very practical, and this is perhaps most true in skills development. But while there are many situations in which technologies help to "teach" skills (for example, a video that demonstrates a technique, a computer program that corrects spelling), it is the exceptional learner who learns wholly from technology. One observer suggested that technologies that provide for practice and feedback can be very useful for building learners' confidence and skills. Learners can then go on to apply these skills in a new context, supported by mentoring and interaction with peers and/or an instructor.

The Instructor's Perspective

So far, we have considered primarily the perspective of the learner. However, given the important role of the instructor or facilitator, with or without learning technologies, we should also consider the impact of learning technologies for the instructors who use them.

Introducing Learning Technologies

There is considerable literature on the dynamics of adoption of a new technology in organizations, from the time when the "early adopters" take it on through to the period when the majority of people use it, to the point when only a few are not using it.⁸

The institutional setting plays a significant role regarding the effective use of technologies. If people are allowed to explore technologies and determine themselves whether they are appropriate for their particular context, there is more likelihood they will learn more about them and find creative ways of using them. But when the use of a specific technology is mandated by special funding arrangements, the institution must then find instructors willing to undertake pilot projects. Some anecdotal evidence shows that more women instructors are asked to teach using new technologies in trial runs.

The introduction of any new technology, if technology is "a way of doing things," requires a supportive environment in which everyone involved can learn not just how to use a piece of equipment, but how to use it for its best purpose, use it creatively and explore its potential. This type of learning takes place over time and is based on experience as well as training, on cooperative exchanges between users, on mentoring as well as demonstrations.⁹

For a specific situation, instructors need to be able to learn enough about a particular technology and its application to decide whether and how it is useful. They need preparation time so they do not enter a situation with a "sink or swim" feeling. They may need ongoing technical support for themselves and/or their students, and they should have access to information, facilities and time that will help them develop an appropriate evaluation of the experience.

Women Instructors' Concerns

Women interviewed for a recent study on instructors' learning needs indicated that they learned from colleagues, from experience, from their learners, from reflection. They also placed special priority in maintaining connectedness among learners and in minimizing any disruption the technology might cause. Women instructors sometimes report that they feel at a disadvantage in technology training sessions because their orientation is less instrumental than that of their male counterparts, and they want more time to explore and consider how the technology can be best used.

These considerations are as much a requirement for quality learning as the issues more directly related to learners. An instructor who feels constrained to use technology and does not feel competent is less likely to provide a quality learning experience than one who feels in control and comfortable.

Keeping a Holistic Approach in the Forefront

Supporting the multiple dimensions of learning is an essential quality in learning. Focusing on any particular strategy in education can be at the expense of other elements equally essential. Reflecting on their long experience in using technologies for open and distance learning, educators warn about the dangers of depersonalization and an overemphasis on delivery of content rather than facilitation of learning.

Learner Support

Learner support is one aspect of learning that tends to be eclipsed by emphasis on technologies and delivery of content. Brindley urges educational providers to continually assess priorities "within a set of principles that clearly articulate beliefs about the learners and how the learning process can be facilitated." It is especially important to maintain a learner-centred approach and substantial learner support, she notes, in the face of government and private sector enthusiasm to regard open distance learning systems as "high tech", inexpensive and quick methods to provide education and training." She adds, "in tough economic times, it is all too easy to pay less attention to the more complex aspects of the intellectual, emotional, and self-management processes in learning."

The Importance of Evaluation

Another important element is taking the time to consider how well any particular strategy or technology has worked in any particular context. Pacey and Penney note the importance of careful reflection:

Distance education and open learning have always promised and delivered easier access to quality education for learners. This result has been achieved through painful analysis, self-criticism and comparison with benchmarks established by conventional educational institutions.

Effective educators have to rethink the process of learning and education, so that the product of education becomes a curriculum that is designed and modified to meet the needs of the learner.¹⁰

Evaluation is a usual a requirement for any educational innovation. So far, there is insufficient coordination among users and proposed users of new technologies to develop a picture of their effectiveness, both in

how well they serve learners and how they compare to older technologies and to face to face instruction. As the submission of the Association of Canadian Community Colleges (ACCC) to the Working Group on Learning and Training of the Information Highway Advisory Council notes, "Unfortunately, we know little about the effectiveness of learning software and multimedia products from both a pedagogical and cost-benefit perspective."

The ACCC submission promotes an approach of realism and respect for what has been proven effective: It is important that we accept the fact that we are moving and working towards our goals and the process is piecemeal. Consequently, we must build our facilities and acquire our resources in a way that does not preclude any possibilities. Flexibility and 'upgradeability' are key components in the development of an education information technology strategy. We must also build on the lessons learned from previous approaches to distance education, particularly those pertaining to pedagogical issues and sociological impact issues.¹¹

Those directly involved in using learning technologies as learners, instructors, facilitators and planners should have input into how these technologies are evaluated, and insist that issues of gender and marginality are included.

The Economic Rationale

The economic agenda also frames and affects issues around quality of learning. One of the primary economic rationales for the use of various technologies is what might be called "replace the teacher." This rationale emerged in the 1950s with the development of highly structured text based materials that used behaviourist approaches to develop specific competencies, for example, reading and mathematics skills.

The "replace the teacher" rationale has not disappeared. In fact it turned up in the final report of the Information Highway Advisory Council, in reference to the cost of what is termed "The Learning and Training Industry":

Annual expenditures in formal education (excluding training expenditures or employer-based training) add up to approximately \$50 billion. Formal public and private education (excluding employer based training) has a total payroll approximately equal to that of either the health and welfare sector or the transportation and communication sectors. Its payroll is larger than that of all levels of government combined.¹²

Rather than regarding this high proportion of educators as a measure of a country's commitment to social development, as does UNESCO, the IHAC report sees it as a drawback, one that calls for the use of "more efficient" technology based tools:

Indeed, for producers of learning materials, teachers, trainers, and support staff, time is the highest cost of the learning and training process. Using the technology can make the learning process faster and more efficient, therefore cutting costs.¹³

As previous experiments with learning technologies has demonstrated, relying on technology to "replace the teacher" provides a very limited type of instruction suitable only for the most independent and self-

reliant learners. It does not serve the majority for whom human interaction is a very significant part of learning. It is even less appropriate for those who face challenges in re-entering the world of learning and for those whose learning context is shaped by cultural differences, gender, disability or other factors.

Because of the high cost of development of materials, another outcome of the cost-based rationale is the increasing pressure to use the same materials for more and more learners whether or not they fit the profile of the learners for whom the materials were originally developed.

In its section on Learning and Training, the IHAC report asserts that "Canada lacks a critical mass of users to sustain a viable domestic learning and training industry," (which runs counter to the reality that Canada has been successfully educating its own citizens in its own institutions for the past 100 or so years) and encourages provincial and territorial governments "to develop, with the private sector, full credit courses and to make them available to all Canadians" (p.63).

This mass-market approach contradicts the often promoted advantage of the new technologies, that they can be readily developed and customized for particular learners. It also contradicts one of the basic principles of adult education, that the learner's context and experience must be included in the design of learning. This is a particularly critical issue for women learners who have had to adapt to materials and technologies developed for others, rather than have materials and technologies developed for them.

Some Questions about Quality and Equality

The real measures of quality and equality of learning are in the hands of learners, instructors, facilitators and coordinators who can provide direct information about how learning technologies affect them. These are some questions to ask about the quality and equality of learning:

- Is the new technology appropriate for the learning task at hand?
- Does this technology broaden, rather than narrow, the kinds of teaching and learning approaches that can be used?
- Does it support individual learning, by permitting self-pacing, ready access, learner control?
- Does it support social learning, by enabling consultation, peer learning, mentoring?
- Is the technology transferable so that it is useful not just in the specific learning context but in other learning contexts, at work and at home?
- What advantages does it offer over other methods, for example, classroom learning or other technologies?

Endnotes for Section Four

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Section Five

Opportunities for Learning

Overview

This section presents examples of how new technologies can offer a range of opportunities for women's learning. These examples focus on ways women in the educational sector, both formal and technical, and in the nonformal sphere, have accepted the challenges of new technologies and developed ways of using them to meet their needs.

We have tried to select examples that build on principles of adult learning and feminist pedagogy. Many show that holistic approaches can be compatible with new technologies; they include women teaching women or supporting women's learning, adult basic education and management training for Inuit in northern Canada. Technical and social support for the individual learner, the importance of interaction and feedback, and the significance of relating new learning to one's own life and experience are principles that inform these approaches.

Carol Gilligan has spoken of women's fear of "being too far out on the edge," but for some of our respondents, this is where they want to be. Like the female pioneers in the trades and technologies, the women who wander with comfort and ease in cyberspace not only exist in growing numbers but offer their hands to those less confident or fearful. As Dale Spender, a leading Australian authority on women's issues, said in a recent address to Australia's women's network for technical and vocational education and training: "There are only three things to be said about the computer and the Internet to put women's minds at rest: it doesn't hurt (it won't bite you), you won't break it and it won't make a mess."¹ In Spender's view, there should be less emphasis on the technology and more emphasis on women's culture.

No one will argue whether the new technologies have been primarily colonized by men yet women are making their mark in software development, in technical writing, and as communications specialists, designers and innovators. To some, the computer in combination with the Internet embodies a potential and potent force towards "democratization" of learning and knowledge. As one of our respondents put it, "The new technologies can give a woman, if she doesn't have a fear of using it, access to an incredible amount of resources and associated support for anything she wants to do."

The information presented here is also meant to provide examples of "good practice" or to illustrate the potential range of uses for technology. Our picture is based on information collected at a particular point in time and we invite you to add your own examples.

Some Criteria for Good Examples

Examples that demonstrate how new learning technologies enhance opportunities for women's learning have some or all of the following characteristics:

- The technology improves the learning experience compared to what was previously available.

- The technology allows for learning processes or outcomes that could not be accomplished in other ways, in terms of accommodating learners previously unable to participate and/or providing access to learning experiences previously unavailable.
- The improvement of the learning experience is related to the learning itself, such as an enriched experience, greater depth and broader scope of learning, increased opportunities for cooperative and collaborative learning.
- The improvement relates to factors relevant to women's learning (for example, appropriateness of content or process, interaction, connectivity, inclusion of life experience).
- The improvement relates to practical factors for learners, such as increased access, lower cost, more compatibility with learners' other commitments (for example, work or family).

Nonformal Learning and Information Sharing

The ways in which women have organized themselves to use new technologies (particularly the Internet and the World Wide Web) for nonformal learning supports the observation that women use technologies for a specific purpose immediately relevant to their lives. Women are using the Web to exchange information on topics such as personal and community health issues and justice issues including abuse and violence against women. They are also using the Internet to establish lines of communication that transcend regional and national boundaries, establishing a community of women with shared interests in all parts of the world.

One example is the development of an e-mail network in the former Yugoslavia which helps women throughout the region, of different ethnic and social backgrounds, communicate their experience and work towards social change. Their focus is on the end result of what they can do rather than on the technology itself. As the author of an article in *Women'space* notes, "Exercises used during the training do not exalt the technological wonders of e-mail or the computer, but are focused in daily, practical applications that are relevant in women's lives."²

International Networking

In 1996, the Women's Networking Support Program of the Association for Progressive Communications (APC) conducted a survey asking women to reflect on the program and give feedback on developments since its inception. Results indicated that "despite the obstacles, women have made great strides in adopting electronic communications, and have benefitted from the support and facilitation provided by proactive initiatives like the APC Women's Networking Support Program."³

In response to the survey (100 responses from 28 countries), e-mail was identified as the most commonly used tool, with electronic conferencing, mailing lists and Web sites increasingly used as well. Respondents also reported acting as a "bridge" to unconnected groups to share information. For example, a group in Russia reproduces material received by e-mail in other formats, such as print and fax, for distribution to other women through radio and television.

Network Activism

In response to the question "What Do Women Activists Do Online?" Scarlett Pollock points to debating issues, developing priorities, mentoring, caregiving, networking, promoting awareness and taking action.⁴

Members of *Women'space* and other organizations such as Web Networks have also assumed a role in monitoring government supported programs aimed at broadening community access to new technologies. For example, members lobbied the Community Access Program for, among other things, program eligibility criteria aimed at increasing access of women and other disadvantaged groups.

The nonformal learning community has also raised issues related to language as a barrier to access. Virtual Sisterhood discussions (vs-online-strat) are conducted in English but "virtual volunteers" work to make information available online in Chinese, French, German, Japanese, Russian, and Spanish.⁴

Technical Learning

Women are learning about the technologies using a variety of strategies that go beyond the "read this, do that" orientation of manuals and instructional materials. They are mentoring and providing supportive groups for those new to technology, offering informal information sharing tailored to the learner's level of comfort, competence and interest.

Organizations such as the Web Network and publications such as *Women'space* here in Canada provide support to community development groups and other advocacy groups so that their on-line experience works to their advantage. Instructors work with the groups to determine basic needs and to translate those needs into instructional guidance using plain language. Web Network then works with the group to devise innovative, appropriate technical solutions, trains the group in the use of the technology, provides materials and follow up support.

This kind of training is an essential component of access. As stated by one interviewee: "having an account isn't access" or as another put it, "a perfectly good system was in place and it wasn't being used." Technical support, like that provided by Web Network's manual, "Web for Women," helps women's groups achieve practical use of communications technologies.

A number of our respondents said their attitude was to approach technologies systematically, step by step. One of our respondents, who is very conversant with the new technologies and who spoke about her approach, said this:

I always put myself in the role of the user. What would I like to do? Very early on I got involved in multimedia, which then took me into the realm of the traditional audio visual area. And so I got involved in digital imaging, using a computer to control a VCR and camera ... and of course, videoconferencing. So I saw a merging, a convergence of those two areas. I tended to learn other technologies because they were related. For example, an instructor wants to make a multimedia CD Rom about parasites. So then I had to look into what's a good video camera that we could hook into a microscope and then we could just tape it. How do we put titles on the video? Then once we've got that we do the digital and the CD part of it. You have to go through the other technologies as well. Then I became aware how those other technologies ... can be used in a classroom and what it does to the students, how it impacts them, and their reactions to it.

Formal Learning

The need to provide support to learners is echoed in the formal learning sphere. In Australia a National Plan of Action for Women in Technical and Further Education was established in 1992 to address issues surrounding new technologies and the delivery of training to women. A national research project connected to the Plan found that "Women students were not daunted by the need to use communication technologies

and computers in flexible delivery, [rather] ... concerns ... related to limited access and technical services available to support students' use.

Adult Basic Education and English as an Additional Language Programs

In ABE or EAL (ESL) programs, learners can use computer technology for a variety of projects. One instructor observes that because they are accustomed to using memory and visual cues, people with limited literacy can quickly learn how to use computers for drawing, painting, writing and to learn vocabulary. Programs can be used to assist with spelling and typescript and students can produce visually attractive print materials. Mastery of computer skills gives learners a sense of self-esteem and control over their environment and increased confidence in their ability to continue learning.

Learners can also develop confidence by learning how computers work. One instructor ensures that learners she works with have opportunities to move, fix, and take apart computers. One of these learners, a young immigrant woman, went on from an ESL program to complete a library science degree at university and then found a job at the local library. One day she impressed her colleagues when the computer broke down and she opened it up and fixed it using skills she had learned in the ESL program.

These ABE and EAL programs adopted some beneficial guiding principles. These are that the program must be appropriate and allow for interaction, that the technology enhance what the teacher is doing, and that the student and her needs must be the program focus. In other words, as the research in Australia concluded, "The power of open learning lies not in the tools—the technology itself—but in the flexibility and thus the power it places in the hands of learners."⁷

Cooperative Research and Collaborative Learning

At Malaspina University College in British Columbia, there are two examples of interactive databases that support cooperative research among learners and researchers engaged at the same time in a project, and between subsequent groups of learners and researchers.

In one example, a multimedia application developed in the field of killer whale vocalization has become a huge sound database that each student can use, adding their own input for others. Once sounds are recorded, the user can isolate one segment of sound, make notes about whale behaviour for that segment and save that sound and the descriptive notes to a new screen. In this way, users can add to and change the application for other users, as well as build up a dynamic body of research over time.

In the other example, a stream survey database has also been built up over time. Each year, students walk the streambed making video and audio notes of what they observe, link to the GPS (Global Positioning Satellite) and input information into a database. One year, aquaculture students might concentrate on the salmon in the stream, the next year biology students might document the vegetation, a third year students might look at soil structures and so on. Again, the user is customizing the database and making it more and more useful for others, contributing to longitudinal studies.

Women's Studies

At Massey College in New Zealand, a new Women's Studies Program includes an extensive distance education component where all but one core undergraduate course are offered at a distance. Program developers have identified that familiarity with communications technologies like e-mail, file transfer, gopher, the Internet and educational "chat" programs is necessary for their undergraduates.

With access to one-on-one tutoring to help them learn computer skills, first year students are assigned projects that introduce them to online feminist resources with the intent that, by the completion of their studies, they will be able to design and compile databases. "The impetus for this comes from a lack of oral histories of women's lives and the sense that networked knowledge bases that have social issues as their focus may be able to become learning and activist tools of use to both the university and community-based feminists."⁴

Management Training

In the Northwest Territories the government is currently implementing a long term plan to double the representation of Inuit people in the public service. The challenge is to provide the required education and training for learners who are dispersed over a vast area. The Human Resources Planning department has negotiated an agreement between an Inuit group, the federal government, and the NWT. Discouraged by the results of packaged computerized learning without support mechanisms, they have turned to a blend of techniques that combine information/communication technologies and personal support.

The program is centred on management training courses currently offered by the Canadian Centre for Management Development in Ottawa. Participants, all employed adults, spend two and a half weeks per year in a classroom. The rest of the time they keep in touch with instructors by e-mail and use technology to form peer support groups. Mentoring in the workplace and participation in different development assignments are integral parts of the training plan. First impressions are that the initial year is going well; a student evaluation is yet to come.

Lessons from these Examples

These examples demonstrate some principles and lead into some broader questions.

- Don't make assumptions about capabilities of learners, for example, that people with limited literacy cannot use new technologies.
- Are nonformal uses of technology more appropriately tailored for women because women are more likely to be making the decisions in these settings?
- Certain technologies can increase the participation of women. Courses that use e-mail or newsgroups discussion groups allow people to spend time "prethinking" what they're going to say, to paraphrase one respondent, and they don't need to interrupt anyone to say it.
- Introduction of new technologies can raise questions about longstanding educational strategies and their effectiveness. For example, using a lecture format is not usually effective in conferencing technologies, "So like how effective was lecturing beforehand?"

Following the Good Examples

Proponents of new technologies often put their "best cases" forward to demonstrate the value and viability of a particular application. It is useful to follow up these examples after the spotlight has faded to determine how well they continue to meet their initial promise. Criteria that can be applied to cases to determine whether they are, in fact, good examples are:

- Does it continue to demonstrate an appropriate use of technology, meeting context, content and the needs of learners?

- Does it continue to be a genuine improvement in providing access to learning and/or quality of learning?
- Is it sustainable, in that it continues to be affordable and manageable after the initial start-up phase?
- Is the technology sufficiently robust in durability and continuity (vs. continual updates, changes, obsolescence)?
- Are there trade-offs in this example? For example, are there some "winners" in terms of increased access, but some losers, in terms of increased cost?
- Is this example a model that can be applied to other contexts, especially related to women's learning?

One would hope that examples that demonstrate effective use of new learning technologies, especially for those who have previously had limited access to learning, will influence the criteria for funding projects. This does not seem to be the case so far.

Industry Canada sponsors programs such as Technology and Applications Development (TAD), which provide up to 50% of the cost, to a maximum of \$1 million, to stimulate innovative research and development of networking projects and applications for the marketplace in healthcare, education and lifelong learning. But in the promotional materials for TAD there is no mention of women or other disadvantaged groups. In fact, these references are conspicuous by their absence. This is not to say that women need not apply, but that it is not an inviting environment.

The Global Picture

Some issues highlighted in "Adult Learning in a New Technological Era," a recent report of the Organization for Economic Co-operation and Development on the opportunities, outcomes and challenges,⁹ are:

- The potential of technology to enrich individual and community life, e.g., people can write and perform music, develop and share family trees, re-design their own kitchen, publish their own writings.
- The potential of technology to increase accessibility to intellectual resources, particularly for learners working and studying off-campus which, in turn, points to the need for local networks and connections.
- The potential for instructors to keep abreast of new developments in their field.
- The use of techniques not otherwise feasible, e.g., using video cameras and digitized images to improve physical performances (in dance, sports), or using simulations to perfect skills.
- Using introduction of new technologies as a stimulus for re-examining existing teaching practice and course material to ensure that technology is not introduced simply because it is there.

Some Questions about Learning Opportunities

Learners, teachers, facilitators and planners should all be in a position to examine how new learning technologies are being used and what opportunities are being provided. The following questions address issues that commonly arise with new programs and new technologies:

- What new opportunity does it provide? To whom does it provide it?
- How is the opportunity provided: what systems does it use, what support, staffing, and so on?
- What are the prospects for sustainability?
- How durable or stable is the technology? How likely is it to change, and if it changes, will it displace the learning opportunity or require retooling?
- What are the "opportunity costs"? Are there trade-offs that might mean, for example, reduced funding for other programs or limited access because the technology is not generally available?

Endnotes for Section Five

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4. *Women'space Magazine*, Vol.1, #4, April/May 1996, p.4.
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6. Kaye Schofield, "National Training Reform in Australia: The challenge for women," *Women's Education des femmes*, Vol.11 #4, pp.36-41.
7. Ibid.
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9. Proceedings prepared by the Centre for Educational Research and Innovation, 1996, pp.15-21.

Section Six

Tools and Strategies: Responding to the Issues

Overview

As we have seen throughout this discussion paper, factors affecting women's use of learning technologies are connected to structures and decision making at a range of levels. As well, the rapid changes in computer and communications technologies make it challenging to keep a current picture and to understand the implications of new developments.

In the midst of this complexity, it is important to remember that all these developments result from people making decisions, even though they are sometimes portrayed as the inevitable outcome of "technological forces." In many cases, these decisions take place in a context shaped by various levels of government policy. This means that it is possible, as citizens, to follow the thread of decisions until we reach the level of public accountability. It also helps to have a road map, a sense of the various components of the picture and how they interrelate. This section explores how we can develop our own road maps to the issues that affect women's use of learning technologies and how we can reach decision makers.

The strategies suggested here can be undertaken by individuals, by formal and informal groups that share and coordinate tasks, and by networks of groups using both conventional forms of communication and some of the new technologies. There are already many examples of women's networks using technologies for communication beyond phone trees to fax trees, e-mail, listserves and computer conferencing.

Finding and Sharing Information

Keep a Journal

Keep track of events, policy announcements, announcements of partnerships, funding allocations and so on as they appear in newspapers, newsletters, electronic bulletin boards. Maintain a clipping file of those that are of most interest. To make this more manageable, identify areas of interest among a group of people and set up a system in which each person keeps track of one area and keeps others informed of relevant items of interests. Develop a mechanism for sharing information, perhaps by preparing summaries of recent events and comments that can be circulated by letter, fax, computer mail, notices in relevant locations, and so on.

Keep in Touch with the Local Picture

As Menzies, Innis and many others have pointed out, the local picture is our ground, our touchstone, against which we can test the outcome of strategies and initiatives. It is important to maintain a "local reality file" to document and share experience and information on the local level, both to support local initiatives and to contribute to the bigger picture.

For example, if your community has a learning centre, collect information about how it is used, by whom, and when; find out who is not using it and why, and assemble information that can support

recommendations for improved access and usage. If there are initiatives that may affect local access to learning (for example on the part of telephone or cable companies or educational providers), begin with local representatives to explore the potential impact and follow up, if necessary, to identify the level at which decisions are made.

Contribute to the Global Picture

Information assembled from a number of locales provides a sense of the impact of particular initiatives on large numbers of people. Build connections with people in other parts of the country and other parts of the world to exchange observations. The honest exchange of information based on the experience of users can be used to analyse proposals to import technologies or systems from another country or region.

For example, people in the far north of Canada can indicate how satellite and various radio and telephone transmission systems serve their needs for communication and information, providing information about cost, reliability, appropriateness for learning and so on, to those in other countries whose governments may be considering similar systems.

In the periods before and since the Beijing Conference, there has been a significant development of connection, human and technical, among women and this can provide a basis for enabling people to contribute their reality and experience to the big picture.

Find out the True Costs

The costs of a specific application of learning technology should include initial investments, capital and operating costs and time. The costs of staff time and learners' time are not always considered yet are important factors in accessibility and usability. Another often overlooked area is what can be termed displacement: what cannot be done or paid for because the investment of time and/or money is going to a technology based program. For example, find out if staff levels will be maintained, especially in important areas like counselling and student support, after new learning technologies are introduced.

Apply Lessons of History

As John Ralston Saul notes, memory is "perhaps the first quality that differentiates us from the marketplace and from inanimate machines."¹ There are people among us, aboriginal people in particular, who value memory more than those who, in planning for the future, deny what the past may teach.

Those with memories of previous educational technologies can bring those experiences to bear on current trends. For example, those who remember when community access television (CATV) was proclaimed to be the basis of citizen participation can recognize similar claims for the Internet. Some of the lessons of CATV, such as the impact of corporate ownership and monopolization, can still be applied.²

For those with even longer memories, or an interest in the history of technology, there are historical examples of citizen participation in radio and of community broadcast uses of the telephone.³ The stories of how these choices were eliminated by commercial monopoly interests and political decisions may offer a cautionary lesson for those who believe the Internet will inevitably lead to democratization of communication and information.

Keep in Touch

Find ways to link with others who are concerned about similar issues. Form alliances and develop connections among cross sections of groups: those interested in education, learning, training, those interested in learning technologies, and advocates for users and decision makers. Exchanging information among disparate groups can itself be a form of education.

Get the Real Story

Assess the Risks

Dale Spender has noted that women are more likely than men to assess risks before taking action and suggests that, although risk aversion may make women less adventurous about technology, it is "a positive advantage in our technological society. ... This risk assessment factor is the quality factor, it is precisely what we have left out of our decision making processes in the technological context." She suggests that the picture of western technology might be very different if decision makers had asked these basic questions:

- What is it for?
- Do we need it?
- Can we afford it?
- Who will clean up the mess afterwards?⁴

Search Behind the Statements

Assess language, statements, claims, evidence and data against information available from other sources. Analyse how information is gathered and how statistical information is changed and interpreted in the transfer from Statistics Canada reports to a newspaper article, for example.

Examine the statements of policy makers, decision makers and politicians for the basis on which statements are made. For example, find out what it means to say that "there are now 50% more women users of the Internet than there were 2 years ago." How many are there now? How many were there two years ago? What proportion of the whole Internet user population does that represent? How are "users" defined: are they those who have Internet accounts whether or not they use them regularly, are they people who are on line every day, every week, every month? Where are the users: in urban or rural areas, in schools and colleges or in the community?

Also, determine how the statement tallies with other available information, for example reports from Internet providers on the gender breakdown of their subscribers and their usage patterns. Unchallenged statements can continue to be repeated until they have the force of truth on which decisions are made.

Community Evaluation

In formal education, evaluation and research are very important strategies to guide decisions about whether or not to continue with a program, expand it or apply it in other situations, and under what conditions. Although it is sometimes portrayed as the domain of experts, evaluation is basically well organized observations about experience.

Community based research strategies enable people with direct experience to record their observations and compile a picture that can be used to support decision making.⁵ Learners, instructors and program coordinators obviously have valuable experiences to contribute to a picture about particular programs and

technologies. But so do others in the community, including those who could *not* participate, and their story will more likely be included in a "community snapshot" developed by community members rather than in official institutional statistics and reports.

Evaluate Programs

Champion Good Examples

Keeping track of programs can lead to some very good examples of how technologies can be used to support learning that is appropriate, accessible, and meaningful. These may or may not use the latest technologies but demonstrate a good application, one from which lessons can be learned, one that may serve as a model or provide a framework that can be adapted for other situations. They demonstrate sustainability and can continue on an affordable and manageable basis even after start up funding is no longer available. They meet stated evaluation standards and address a defined learning need.

Documenting and championing these examples achieves a number of goals. It can achieve visibility for a program so that it is less subject to cutbacks or elimination. It can provide positive feedback to planners and participants and develop their confidence, encouraging them to undertake other initiatives. And by confirming the value of a particular technology for certain applications, it can help support the sustainability of that technology. Letters of appreciation, letters to decision makers, informal feedback and active participation in meetings can all be used to indicate support.

For example, recent reports have (once again) predicted the phase out of audiotape, one of the most useful, user friendly and affordable technologies for learning. It is the one technology other than print that people can use themselves to develop learning materials in almost any situation and it is extremely useful for those unable to use print materials. It is essential in language learning and can be an important part of other applications such as learning technical skills (where people are talked through an activity) or where the voice is an important part of learning (such as in counselling, music or speech). Documenting these applications would help challenge the elimination of audiotape.

Analyse the Bad Examples

Observing that a program or application didn't work well is just the beginning. The next step entails pinpointing why it didn't work so that this example is relevant for future decision making. Questions to ask include whether the problem was intrinsic to the technology or the result of circumstances that could be different next time.

Other questions include: Why was the technology used in this case? Was the program well planned, in consultation with everyone involved including instructors, learners, and managers? Was there enough lead time to put it in place? Was the technology appropriate for this context and this type of learning? Was the technology reliable? Did instructors or learners have difficulty using it? Could some of the negative outcomes be reduced or eliminated by using different strategies or by taking more time? Are there positive outcomes that could serve as a lesson for future action?

Discover What the Options Really Are

Often technologies are presented with unnecessarily limited options, like when Henry Ford offered Model

Ts in any colour as long as it was black. Early telephony could accommodate group discussions in a community, and was even used for broadcasts, but this function was eliminated by about the 1920s through structural and technical decisions by corporations and governments.

Today, there are similar decisions to be made about expanding the broadband access needed for increased use of computer and conferencing systems (ISDN, ASDL, cable, satellite, etc.). Some of them involve changes at a central point, some involve changes to entire infrastructures, such as the type of cable that carries the signal, some involve changes to how the cable is used and how the signal is prepared for distribution.

Regulatory decisions may also limit options as in the new CRTC stipulation that one component of service cannot be used to subsidize another component. This change is a political decision that may well result in whole areas not receiving service because the cost cannot be reasonably recovered by charges to subscribers.

Behind such a decision is a range of possible choices, both technical and political, about what kind of systems to use, what groups of subscribers or types of service are considered when assessing cost recoverability, what policies govern specific rate structures, and so on. These choices are rarely exposed or explained in decision making, or tend to be addressed superficially. The costs of any service can be defined in a variety of ways depending on how the various expenses are accounted for.

Find out Where the Boat is Going...

...and decide if that's your destination before you jump on for fear of missing it. We too are decision makers, but our decisions can be influenced by external pressures like the urgency to not "miss the boat." This is particularly compelling for women who have felt left behind by many technologies in the past. There can be a strong desire not miss out this time, to have a chance to influence how things will work out before it's too late.

But each of us needs to assess our own goals, and how any given initiative is related to them. Heather Menzies argues in *Whose Brave New World* for the need to take time to connect with each other in a personal way to reflect our realities and share our perceptions so we can assess the implications of a particular direction in society.⁶ Creating a sense of urgency, a standard tactic of both high pressure sales and of propaganda, prompts us to bypass our better judgment, circumvent considered thought and jump on the boat.

Explore Underlying Values

Question the Values Behind the Statements

Question the values and validity of statements that are made. For example, the often repeated phrase that education is essential to give Canadian workers a "competitive edge in the new economy" has a number of value laded implications. Competition implies winners and losers, which is contrary to an egalitarian society. If competition with other countries is implied, then some countries will be losers which is contrary to supporting marginalized societies.

In the case of educational technologies, one could ask if the rationale for using a particular technology is to

save money or to provide better learning. Some technologies favour certain kinds of learners, such as those who are "quick off the mark" in responding rather than those who wait and think. Protocols can be developed that value the participation of both the "talkers" and "thinkers."

Check out the Terminology

Commonly used catch phrases can be questioned, peeling away the assumptions and values behind a particular policy or action. This strategy entails finding out the frame of reference that shapes the meaning of a particular word or phrase. As Humpty Dumpty said, "When I use a word, it means just what I choose it to mean," adding "the question is which is to be master, that's all."⁷

The term "knowledge workers" can mean a variety of things to different people. It can mean those who input information into databases, those who believe they know what's going to happen next or those who work in jobs that require advanced education. A new cable technology that claims to provide "two way communication" actually provides one way transmission of product information with just enough return bandwidth to enable subscribers to order the items.⁸ By the same token, phrases such as "information economy" and "global market" are commonly used without explanation, but exploring their meaning can provide some idea of underlying values and purposes.

Examine the Access and Equity provisions

One might expect that public policy initiatives for new technologies would require the same equal opportunity and access provisions for women, minorities, people with disabilities and aboriginal people that are required under law for many aspects of education, employment, housing and so on.

However, this is not necessarily the case. As we have mentioned elsewhere, the Community Access Program, sponsored by Industry Canada, is silent on the subject of equal access and certainly does not require applicants to make provisions for the inclusion of equity groups.

This is in contrast to the Commonwealth of Learning (COL), an organization begun in 1989 to support the development and sharing of open learning and distance education resources and technologies among member countries. Based in Vancouver, Canada, and supported by all Commonwealth states, COL has established the principle that all projects it supports must demonstrate equality of access for women and men. Not only does this ensure access, it helps to develop awareness of access issues and influence a change in perspective in Commonwealth countries regarding women's access to learning.

Equity of access should include access to training, childcare, transportation, affordability and the equivalent of "cut curbs," i.e., designs that support universal accessibility. Specific support mechanisms should be available to people with disabilities and access should also be without language barriers.

Convey Concerns to Decision Makers

It can seem very difficult to track down who makes decisions and how they are made. One useful strategy (developed by the Ecumenical Coalition on Social Justice, formerly GATT-Fly) is called the Ah-Hah! seminar. Based on "the assumption that people acquire a basic knowledge of how the political and economic system works through their own lives and experiences," this group process prompts people to map out the connections between their day to day lives and decisions that affect them, literally drawing a very large picture that links each level of activity and decisions.

Another way of finding out where and how decisions are made is to "follow the gold." Find out where financial interests are, and what sources of funding are supporting a particular initiative.

Although letters to political representatives may feel like a very pedestrian means of conveying concern, the fact remains that this channel of communication connects us directly with the political decision making forum and we need to use it if we want to maintain healthy accountability. Experience so far indicates that a written letter has better success in obtaining a response than electronic communication.

There are also occasions when exposing decisions in well-timed presentations to the media is useful; a recent example is the protest surrounding cable companies' so-called "negative option billing," resulting in a reversal of private sector policy and a change in public sector regulation.

Keep on Asking Questions

The questions at the end of each section in this paper can serve as "starters" for further explorations related to new learning technologies and women. You are invited to continue exploring the issues and to add questions of your own.

Endnotes for Section Six

1. John Ralston Saul, *The Unconscious Civilization*, CBC Massey Lectures, Anansi, 1995, p.186.
2. Kim Goldberg, *The Barefoot Channel: Community Television as a Tool for Social Change*, New Star, Vancouver, 1990.
3. John Stevenson, "The Silencing of a Democratic Medium: Early Public Policy on Radio and the Regulation of the Internet," paper presented at INET 1996; Michelle Martin, *Hello Central? Gender, Technology and Culture in the Formation of Telephone Systems*, McGill-Queens, 1991.
4. Dale Spender, "The Internet as a Networking Tool for Women," keynote address to the International Meeting of the Women's Network for Vocational Education and Training in the Asia Pacific, July, 1996.
5. Two books that offer guides to popular research are Rick Arnold, Deborah Barndt and Bev Burke, *A New Weave: Popular Education in Canada and Central America*, CUSO/OISE, 1985 and GATT-Fly, *Ah-Hah, A New Approach to Popular Education*, Between the Lines, 1983.
6. Heather Menzies, *Whose Brave New World*, pp.138,139.
7. Lewis Carroll, *Alice in Wonderland*, Collins, p.209.
8. Mark Surman, "Wired Words: Utopia, revolution and the history of electronic highways," paper presented at INET 1996.

Conclusion

What's Next: A Highway or a Community?

This discussion paper presents more questions than answers. This is deliberate, because the intent of the paper is to promote further exploration. It is also unavoidable, since the area of new technologies and learning has many unanswered questions. But many deliberations are now underway that will affect whether new technologies really provide accessible and meaningful learning opportunities. Keeping in touch with this issue requires considerable tolerance for uncertainty, some occasional detective work, and a commitment to discerning reality in the midst of continually evolving terminology.

We have referred to the pressure to "not miss the boat," to not be left behind by technological innovations. Rather than a transportation analogy, with its implication of leaving one place and arriving at another, it may be more helpful to use an analogy of community.

Like growing up in a neighbourhood, learning is not a one time activity but a continuous part of life. Developing a liveable community takes time, vision and a commitment to accommodate input from a broad range of interests. As one new rural resident put it, "It's not a question of how long I've been here, but of how long I plan to stay." The impact of any technological system tends to remain even after specific technologies have moved on. We can all say we will be staying a while in a context that includes both learning and technology, and that we all have a right to speak.

The planning process involved in building a liveable community offers an alternative to the concept of a high speed chase down the Information Highway. It recognizes the value of setting up patterns that promote usability, liveability, flexibility and the importance of supporting human connectedness. Can we do this with new learning technologies?

It is hoped that discussion of this paper, and the activities that follow, will help those concerned with women's learning to participate in decisions around policy, financing, technical standards and approaches to teaching and learning. These are the critical factors in determining how well learning technologies achieve their promise.

Glossary

Adult Education: the field of education that serves adult learners and includes formal programs, such as post secondary credit courses or continuing professional education, and nonformal programs, such as workshops, and workplace training.

Adult Retraining: usually a program that enables adults to develop new job-related skills that are in demand in the workplace.

Adult Upgrading: programs that enable adults to fill in the gaps in their earlier education, particularly in the areas of literacy and numeracy.

Adult Basic Education (ABE): programs that enable adults to develop basic literacy and numeracy skills, to the level normally attained at the completion of elementary school.

Asynchronous communication: communication in which the sender transmits a message at a different time than when the recipient receives it. For example, a letter sent through the post is received some time after the writer sends it.

Asynchronous Transfer Mode (ATM): high speed networking technology for broadband communications.

Audioconferencing: telephone based conference that includes more than two sites linked by a bridge or series of bridges so that all participants can hear and speak to each other.

Audiographics: a computer based system that provides computer generated graphics over telephone lines, often to accompany voice messages provided by audioconference.

Broadband systems: a range of communications services that can transmit video images and data, as well as sound and require more bandwidth than traditional voice messaging.

Cable system: the system of delivering television signals through satellite receive dishes that are connected to a local network of co-axial (high capacity) cable.

Canadian Radio-Television and Telecommunications Commission (CRTC): the Canadian government agency that develops and enforces regulations governing broadcasting, cable and telephone systems in accordance with federal government policies.

Computer Conferencing: a computer-based discussion system enabling participants to contribute written ideas transmitted as computer mail. Conferencing software sets up discussion topics and linkages so that participants can follow the threads within a discussion, or begin a new discussion on a related topic.

Computer Hardware: computer equipment, such as the processor, keyboard, monitor, printer, connecting cables.

Computer Software: electronically coded systems that "drive" the computer and enable it to do specialized tasks, such as word processing, communications, drawing, and so on.

Continuing Education: forms of education for learners beyond the age of the cohort who complete their education in a continuum from elementary school to graduation. Continuing education can include programs related to professional training, formal credit programs, or interest courses.

Distance Education: education in which learners and instructors are in different locations and are linked by various forms of technology, including print correspondence, telephone, teleconferencing, videoconferencing, computer communications. Learning materials may be provided in print, audiotape, videotape or computer based materials.

Educational Technologies: the group of technologies used to support education from blackboard and chalk to computer conferencing.

Educational Providers: organizations, institutions and agencies that provide educational programs.

Electronic mail (e-mail): a communication system whereby a computer user can send a message using the electronic connections provided by the Internet to a computer user that is connected to the same system.

Formal education: education offered by public or private educational institutions following standardized curricula and providing recognized accreditation.

Freenet: an Internet server organized on a cooperative basis by members to provide free or low cost Internet access to its members.

Full time enrolment: the total number of students enrolled full time at an educational institution. Definitions of full time study are not consistent but usually include learners who take more than three courses in one term or semester.

Information Highway: also called the electronic highway, an advanced information and communications infrastructure that links businesses, homes, governments and institutions, and provides a range of services including entertainment, education, cultural and social information, databanks, computing, electronic commerce, banking and business services.

Internet: a network of networks that links computers and enables transfer of information and communication worldwide.

Internet Service Provider: an agency that, through hardware, software and communications systems,

provides the bridge that links local computer users to the Internet.

Lifelong learning: the concept that learning continues throughout life in response to needs related to training, interest, or skill development.

Modem: hardware that converts data into the digital language of computers and allows computers to communicate through telephone lines.

New Educational Technologies: or "new learning technologies" usually refers to electronically based systems for communication and information transfer, such as audioconferencing, audiographics, videoconferencing, electronic mail, and computer conferencing.

Nonformal learning: a learning experience that does not lead to specific accreditation, from interest courses offered by educational providers to an individual's learning project pursued for personal interest.

Open learning: a system that provides more flexible access to learning than is available through conventional classroom-based instruction, and can include strategies such as materials for use at home, access to tutorial help on a "drop-in" basis, and computer programs that learners access at a local centre at their own convenience.

Part time enrolment: the total number of learners who study part time, as defined by the educational institution, but usually including those who take three courses or less in a given term or semester.

Post Secondary Education: the educational system that comprises universities, colleges, university-colleges and technical institutes.

Real time Transmission: the transfer of data, voice or video images at the same time as the recipient receives it.

Satellite Transmission: sending data, voice or images by means of an electronic signal to antennas on a geostationary satellite in space that is moving at the same speed as the earth's rotation and is thus in a fixed position over a specific region of the globe. The signal is then transferred from the satellite's antenna to satellite receive dishes on earth.

Training: programs focussed on skill development enabling learners to attain trade or professional qualifications, or to meet the skill levels required of a specific type of job.

Universal Education: the principle that all members of the population have the right to a certain level of education or to education between specified ages.

Videoconferencing: a system of transmitting video and sound images between two or more sites enabling participants to see and hear each other. The signal may be transmitted by satellite or through the telephone system depending on the equipment and networks available in a particular region.

World Wide Web: an Internet system that provides access to a wide range of information by linking documents that can include text, graphics, sounds. An individual or organization provides information in a format especially designed for the Web on what is called a Webpage. Software, known as search engines, enables users to find sites using keywords or phrases. The process could be compared to a giant encyclopedia with pictures and with pages contributed from people all over the world.

Annotated Bibliography

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Overviews of the social, political and economic contexts

Ursula Franklin, *The Real World of Technology*, CBC Massey Lectures, Anansi, Toronto, 1990. A commentary on the ways in which technology interacts with social, economic and political dynamics, including reflections on historical uses of technology and suggestions for regarding technology alternative to its unquestioned acceptance.

Heather Menzies, *Whose Brave New World: The Information Highway and the New Economy*, Between the Lines, Toronto, 1996. A commentary on the drive to displace workers and to implement a corporatist agenda by introducing new information technologies; presents an alternative perspective on what is called "the technological imperative" and recommends strategies for responding to the social, economic and political dynamics that support this imperative.

John Ralston Saul, *The Unconscious Civilization*, CBC Massey Lectures, Anansi, Toronto, 1995. Explores the ways in which the accepted notions of our society as a democracy directed by individuals is at odds with the reality of a corporatist agenda that is colonizing decision making at all levels of political and economic life.

"Seduced by Technology: The human costs of computers," *The New Internationalist*, No. 286, December, 1996. An issue dedicated to exploring the impact of the new technologies worldwide.

Guides and commentaries

A. W. Bates, *Technology, Open Learning and Distance Education*, Routledge, London and New York, 1995. Designed for educators and planners, outlines the main organizational issues in open and distance learning and presents the educational, organizational and economic factors that influence decisions about selection of technologies and teaching/learning strategies.

Council of Ministers of Education, *Distance Education and Open Learning: A Report*, Occasional Paper # 1, Toronto, 1995. Provides a snapshot of open and distance learning in Canada at the elementary, secondary and post secondary levels, and presents some cases that demonstrate key issues in the field.

Judith Roberts and Erin Keough, eds, *Why the Information Highway: Lessons from Open and Distance Learning*, Trifolium, Toronto, 1995. A collection of essays by experienced educators in open and distance learning that address theoretical and practical issues for educators, learners and users of educational technologies.

Women's learning and technology

Elizabeth Burge, "Learning in Computer Conferenced Contexts: The Learners' Perspective," *Journal of Distance Education*, Vol. X1, No 1, Spring, 1994. Summarizes the results of qualitative research about learners' responses to using computer conferencing as the primary medium of communication among learners and instructors.

Elizabeth Burge and Helen Lenskyi, "Women Studying in Distance Education: Issues and Principles," *Journal of Distance Education*, Vol. V, No. 1, Spring, 1990. Describes a women's studies courses offered through educational technologies and using learner-centred principles.

Dianne Currie, "The Construction of Gender at UBC Computing Services," *Feminist Collections*, Vol. 17, No. 2, Winter, 1996. Describes different approaches, based on gender, to the use of computers and to the provision of computer user support services at the University of British Columbia.

Gill Kirkup, "The Importance of Gender as a Category in Open and Distance Learning," keynote address at *Putting the Student First: Learner Centred Approaches in Open and Distance Learning*, Open University East Anglia, Cambridge, 1995. Outlines some of the issues that are highlighted when documenting women's experiences in using new learning technologies in open and distance learning and in other settings.

Susan May, "Women's Experience as Distance Learners, Access and Technology," *Journal of Distance Education*, Vol. X1, No. 1, Spring, 1994. Describes the experiences of women distance learners and points out the value of distance education in providing access to learning even though women still face other challenges such as limited time.

Christine von Prummer, "Women-friendly perspectives in distance education," keynote address at conference on *Feminist Pedagogy and Women Friendly Perspectives in Distance Education*, Umea, Sweden, 1993. Outlines research and observations about the application of feminist pedagogical principles to distance learning programs, noting that social learning features were important to many learners.

Leslie Regan Shade, "Being Digital and Domestically Challenged: A Gendered Perspective on Access," chapter in PhD thesis, *Gender, Community and Social Constitution of the Internet*. Highlights some of the more important considerations that relate to women's access to and use of Internet-based communication.

Leslie Regan Shade, "Women, the World Wide Web, and Issues of Privacy," *Feminist Collections*, Vol. 17, No. 2, Winter, 1996, pp. 33-35. Addresses issues related to personal safety, trust and privacy that arise with the use of an open communication system such as the World Wide Web.

Ongoing Resources (Web and print based)

Alliance for a Connected Canada is an association committed to ensuring access to communications technology. Network Canada Alliance: <http://www/global.com/connect>

Canadian Women's Internet Association: <http://www.women.ca/www.women.ca>

Feminist Collections: A quarterly of women's studies resources. Published by University of Wisconsin System Women's Studies Librarian, 430 Memorial Library, 728 State St., Madison, WI, 53706, and available on WWW. Usually includes some articles about women and technology; Vol. 17, No. 2, Winter 1996 is a special issue on Women's Studies and Information Technology: Reports from the Field <http://www.library.wisc.libraries/WomensStudies/fcmain.htm>

Information Highway Working Group: IHWG's mission is as follows: "Canada has a history of turning communications technologies into tools for national cohesion. It also has a history of making sure that everyone has access to these tools. The IHWG is working on policy alternatives to ensure that this historical legacy makes it onto the information highway." <http://kows.web.net/ihwg/index/html>

Women'space, print and web based newsletter produced in Canada and designed "to promote accessibility to the Internet, its tools, information and resources; enhance the effectiveness of women's organizing through national and global connections; bring global online resources to local community actions; support the exchange of ideas and experiences and amongst women and women's groups." <http://www.softaid.net/cathy/vsister/w~space/womspace.html>

Women's VET Network (Women in vocational and technical training in Australia) : <http://sunsite.anu.edu.au/wnet/new1.htm>

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